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NORTHWESTERN UNIVERSITY MEDICAL SCHOOL

Department of Medicine

GRAM STAIN OF THE STOOLS

A METHOD APPLICABLE IN THE DIAGNOSIS OF CARCINOMA OF THE STOMACH

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SO far as is known to the writer, the credit for the idea that a Gram stain of the stools might aid in the diagnosis of carcinoma of the stomach belongs to the Neusser Clinic in Vienna, and is based upon the original work of the first assistant in the clinic, Dr. Rudolf Schmidt.

Much original work has been done in the Neusser Clinic upon the so-called "lactic-acid flora" of the gastric contents in cases of carcinoma of the stomach, and Schmidt has summarized most of this work in an interesting article, which appeared in the last number of the *Mitteilungen aus den Grenzgebieten der Medicin und Chirurgie*, band xv, heft 5.

Schmidt was the first to cultivate successfully upon a practical artificial medium (two-per-cent glucose agar) the so-called "lactic-acid" or "Boas-Oppler" bacillus of the gastric contents in cases of carcinoma of the stomach, and it was by this means that he was able to identify the same bacillus in the stools of such patients. He found that these bacilli not only survive in the intestinal contents in their passage through the gastrointestinal tract, but that in some cases they actually multiply to such an extent as to exceed the colon group in numbers in the stools, and in some cases to supplant almost totally the latter.

Since the so-called "lactic-acid" or "Boas-Opler" bacillus is Gram-positive, at least Gram-positive when young, and only becomes Gram-negative in part as it grows older, this stain affords a simple means of distinguishing these bacilli from the Gram-negative colon group, which usually predominate in the normal stool.

This has given rise to the practical clinical procedure of staining smears from the stools of cases in which a carcinoma of the stomach is suspected, with the idea that such specimens may show a great increase in the bacillary Gram-positive elements — a point which might speak for a diagnosis of carcinoma of the stomach.

The technique used is as follows:

1. Thin smears are made from the stool, upon cover-slips.

2. Dry, and fix for five minutes in methyl-alcohol, thus dissolving away the fatty substances in the smear which interfere with a clear stain.

3. Stain in aniline oil gentian violet for five minutes. Wash.

4. Treat the specimen with Gram's iodine, potassium iodide mixture, until it becomes a deep purple color. Wash.

5. Decolorize in 95-per-cent alcohol until almost all color has disappeared. Wash.

6. Counter-stain in a weak aqueous fuchsin solution. Wash, dry, and mount.

The staining is best done in watch-glasses, and a strong light is required in examining these specimens, since with a poor illumination it is difficult to distinguish between the violet color of the Gram-positive and the red of the Gram-negative bacteria.

Using the above method, the varying stools of a presumably healthy individual have been systematically and persistently watched during the past winter, and also numerous examinations of the stools of the ordinary run of cases in the medical wards have been made, especial attention being paid to the Gram-positive bacilli. For our purpose, the Gram-positive cocci, spores, etc., that occur in stools are disregarded, and attention paid only to the bacillary elements.

In such "normal" specimens one sees Gram-positive bacilli of all morphological varieties—large and small, thick and thin. As far as the proportion in actual numbers of Gram-positive to Gram-negative bacilli is concerned, one may recognize a great variation, which is still within the normal range. In the normal stool the Gram-negative colon group usually far outnumbers the Gram-positive elements; hence the normal stool is a "Gram-negative stool."

In a typical "Gram-positive stool," as is often found in carcinoma of the stomach, one recognizes not only the numerical preponderance of Gram-positive elements, but also the fact that these bacilli are for the most part morphologically uniform.

One comes to look upon the uniformity in size and shape of the Gram-positive bacilli as a factor which is quite as characteristic of a typical "Gram-positive stool" as is the mere presence of a greater number of Gram-positive over Gram-negative bacilli.

One may see normal stools in which the Gram-positive elements seem to be quite as numerous as, if indeed not more numerous than, the Gram-negative elements, yet here one finds that the great variety as to form and size of the Gram-positive elements is in great contrast to the uniformity which is found in the typical examples of Gram-positive stools.

Schmidt recognizes three types of Gram-positive stools:

1. "Lactic-acid bacillus type." The bacillary Gram-positive elements are thinner than the colon bacillus, and vary greatly as to length, are without spores, and are nonmotile. They show, here and there, areas in the bacilli which are Gram-negative. Upon staining such fresh specimens with Lugol's solution, the bacilli stain yellow, and show granules here and there in the protoplasm of the bacillus. By this means these bacilli may be identified without resorting to culture methods. They may be cultivated upon a two-per-cent glucose agar.

These bacilli have the same characteristics as the bacilli found in the coffee-ground stomach content of cases of carcinoma of the stomach, and their presence in the stools has the same diagnostic value as their presence in the stomach content.

2. "Pseudo-colon bacillus type." Showing bacilli which are morphologically the same as the colon group, but are, however, Gram-positive, and cannot be cultivated. This stool picture occurs in catarrhal conditions of the large intestine, especially where the stools are very acid; i. e., a catarrh due to chronic tubercular process, or a carcinoma of the intestine, etc.

3. Type of Gram-positive, plump bacilli, in long chains. These bacilli stain blue with Lugol's solution, and cannot be cultivated. This stool picture occurs in chronic catarrhal inflammation of the lower bowel, especially when associated with atony and flatulence.

The "lactic-acid bacillus type" (type 1) is readily to be distinguished from the other types by the morphological and tinctorial peculiarities of the bacilli, and it is this stool which is of especial interest in the diagnosis of carcinoma of the stomach.

During the past winter I have had the opportunity of examining the stools of twenty-five patients in which the possibility of a carcinoma of the stomach was especially to be considered and in which the diagnoses were subsequently confirmed, either by post-mortem, by operation, or by the subsequent course of the cases. Of these 25 cases, 17 showed Gram-negatvie, 6 Gram-positive, and 2 almost exclusivelyGram-negative stools, as tabulated below:

	Number of Cases	Gram-positive	Gram-negative	Almost exclusively Gram-negative
[1] Carcinoma of stomach	6	5	1	.....
Carcinoma of stomach	1	1	.....	.....
[1] Carcinoma of splenic region (not primary of stomach)	1	.....	1	.....
[1] Benign stenosis at pylorus	4	.....	4	.....
[1] Gall-stones	3	.....	3	.....
Chronic gastritis	2	.....	2	.....
[1] Chronic gastric ulcer	1	.....	1	.....
Acute gastric ulcer	1	1	.....	.....
[1] Cirrhosis of liver	2	.....	1	1
[1] Perihepatitis and perigastritis	1	.....	1	.....
[1] Myocarditis	1	.....	1	.....
Pernicious anæmia	1	.....	1	.....
Chronic nephritis	1	...	.....	1
Total	25	7	16	2

[1] Diagnosis confirmed either at post-mortem or by operation.

In the sixteen cases showing Gram-negative stools, this fact was considered a point which spoke against the probability of a carcinoma of the stomach being present, and of this group only one case was a case of carcinoma of the stomach.

Of the seven cases showing Gram-positive stools, this fact was considered a point speaking in favor of a diagnosis of carcinoma of the stomach, and of this group six were carcinomas of the stomach and one an acute gastric ulcer.

The list contains seven cases of carcinoma of the stomach, six of which showed Gram-positive stools (type 1), and one a Gram-negative stool. Two of them showed almost exclusively Gram-positive bacilli; i. e., the "lactic-acid" bacillus seemed to have almost totally supplanted the colon group.

The case of acute gastric ulcer showing a Gram-positive bacillus stool flora also showed an exclusively Gram-positive bacillus flora in the vomitus. The bacilli of the vomitus seemed to be, morphologically at least, identical with the Gram-positive bacilli of the stools. They were rather short, plump, Gram-positive bacilli. (See Fig. 5.)

This case is of interest, especially because it seems to point to the truth of the statement that the flora of a pathological stomach content may still be present, and in some cases even predominate in the flora of the stools.

In the two cases showing an exclusively Gram-negative stool flora, this finding was considered to be a point which spoke decidedly against a diagnosis of carcinoma of the stomach.

One of these cases was referred to Dr. William E. Morgan for operation, with a diagnosis of carcinoma of the stomach. The patient was vomiting persistently, and the passage of a stomach-tube was out of the question. There were albumin and casts in the urine. A Gram stain of the stool was made, which showed an exclusively Gram-negative stool. This fact was considered a point which spoke decidedly against the probability of a carcinoma of the stomach being present. Dr. Morgan refused to operate, considering the gastric phenomena to be due to uræmia, and the subsequent course of the case shows that his diagnosis was correct.

The second exclusively Gram-negative stool case was a case of cirrhosis of the liver in which the possibility of a carcinoma of the stomach was to be considered. The exclusively Gram-negative stool was considered to point decidedly against a diagnosis of carcinoma, and the post-mortem established the diagnosis of cirrhosis.

Neusser goes so far as to say that one can exclude carcinoma of the stomach in cases showing an exclusively Gram-negative flora of the stools.

A typical Gram-positive stool, i.e., differing from the "lactic-acid bacillus" (type 1), may be found in other conditions than carcinoma of the stomach, as has already been indicated. According to Neusser, typhoid stools are often Gram-positive, and he relates a case of a Gram-positive stool being present in a greatly emaciated and cachectic woman who was suffering from a carcinoma of the uterus. Her stomach content showed no hydrochloric acid after a test meal.

Schmidt considers the presence of a Gram-positive coccus stool, especially when the cocci occur in clumps, as an indication of an ulcerative process, such as, for instance, an ulcerating carcinoma, or a tubercular ulceration of the intestines.

In summarizing, I wish to emphasize the following points:

1. A Gram stain of the stools may throw considerable light upon the diagnosis of abdominal cases in general, and especially is this

true where the diagnosis lies between a gastrointestinal process on the one hand, and a pathological process occurring in some other abdominal organ on the other.

2. While a Gram-positive stool is in no way pathognomonic of carcinoma of the stomach, yet it very frequently occurs in this condition. The very limited number of these cases that have come under my personal observation, in which the diagnosis has been substantiated by post-mortem or operation, does not allow of a more definite conclusion than this, yet I feel certain that the presence of a typical Gram-positive stool (type 1) is a sign which may be used to an advantage in establishing a diagnosis of carcinoma of the stomach, and especially in cases where the use of the stomach-tube is contraindicated. It is a good, simple, and practical example of applied bacteriology.

3. Schmidt suggests that in cases in which an old gastric ulcer is known to exist, a Gram-stain of the stools may be made from time to time, with the idea that when a carcinoma develops upon the site of the ulcer, it may manifest itself by a change in the stool flora, which would be detected by a Gram stain, and thus lead to an early diagnosis.

4. An exclusively Gram-negative bacillary stool, while uncommon, yet speaks very decidedly against a carcinoma of the stomach being present.

NORTHWESTERN UNIVERSITY MEDICAL SCHOOL
Department of Surgery

A STUDY OF FIVE CASES OF SUBCUTANEOUS OR CONCEALED RUPTURE OF THE INTESTINES TREATED BY LAPAROTOMY

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LAST year I had five cases of subcutaneous rupture of intestines, with three recoveries. (Ruptures of other viscera, penetrating wounds, and perforating ulcers are not here included.) One case was done too late, several days old, and had already general peritonitis. The diagnosis was not positively made before operation, as a large hernia was present, which had been treated for strangulation by forced reduction under anæsthesia.

Another case died on the table before operation could be begun. It probably had a hemorrhage, as well as a torn bowel.

The other three were consecutive cases, and all recovered in a way that set me thinking, and changed my ideas about the fatality of these injuries when early relieved by surgery.

It cannot be a coincidence that these last three cases were saved. We must conclude that under like favorable circumstances, with a correct early diagnosis and an instant operation thereafter, a majority of torn intestines will recover.

And yet, if we search in the literature for statistical proof of this, it is lacking. The mortality has been excessively high because many cases reported underwent operation too late, after the peritoneum was fatally damaged.

The greatest danger which menaces a patient with a ruptured gut is that hesitation or doubt about the diagnosis will cause a "waiting for symptoms," or "waiting for reaction," until changes which are unmistakable are also past relief.

The patient with perforated appendix may have walls of adhesions form and save the peritoneum. To a less extent this may occur in round ulcer of the stomach or duodenum, which has perforated. Even bullet and stab wounds may in rare instances occlude themselves and not leak, but the ruptured bowel

has practically no chance to do this. Fatal peritonitis must ensue.

On the other hand, we know better every year that the peritoneum will tolerate strange insults if immediately washed clean, behaving in this respect not like open tissue, but like a closed membrane. We are encouraged to believe what experiment confirms, that good recovery will follow after extensive soiling of the peritoneum if only the material is quickly and thoroughly washed away. By "quickly" we mean within a few hours after rupture — perhaps less than twelve hours. The three successful cases here reported were treated by operation in from two and a half to eight and a half hours. Could it be done in a few minutes instead of a few hours, could we dive into the work instantly, as we would for a bleeding artery, I believe that practically every case would recover. Suppose that case 3, cited below, could have been operated on before the first peritoneal symptom appeared, is it not possible that they would never have appeared? This case exhibits two positive observations, scientifically made — one demonstrating the absence of the (looked-for) peritoneal signs, and another, an hour later, showing such signs positive. If our results prove anything, they prove that the peritoneum will withstand almost any contact infection for a short time. It is a fair inference that the belly could be found full of the foulest fæces and pus, washed out carefully, and some patients would recover as if nothing had been done. Not only this, but this matter may sometimes lie several hours, until signs of toxæmia set in, and may then be removed mechanically, with comparatively little local reaction and no permanent harm. Yet there cannot be any hard-and-fast line as to time. If there is such a difference in the behavior of cases a few hours and a few days old, there may be a similar difference in favor of cases only a few minutes old.

ÆTIOLOGY

All the cases of this series and most of those in the literature were injured in one of two ways. Either the patient fell heavily, striking the front wall of his abdomen upon some hard angular body, or else a heavy body, such as a timber plank, or table having an edge fell upon him, while supine. In either case the force of the blow was transmitted from the front, through the anterior wall of the belly against its posterior wall, and compressing the viscera between these parts. The anterior wall is muscular, elastic; the posterior, bony and rigid.

MECHANISM OF THIS INJURY

I desire with some diffidence to offer a theory of the mechanics of subcutaneous rupture of he intestine. I believe that *the bowel is cut in two by the angle or promontory of the sacrum*, against which it is forced when the anterior abdominal wall is pushed against the spine.

This is directly opposed to any bursting theory from internal pressure of the fluids or gas in the lumen of the gut. This idea occurred to me while operating upon such a case some years ago, and finding what a sharp edge this bone presented. (See Fig. 1.) If, in autopsies or laparotomy, the surgeon will run his hand across this ridge in a few cases, he will say at once that this, and only this, can cause any shearing action in the abdomen. I do not think any angular object in front pressing the skin and muscles backward could do this alone, nor are the bodies of the vertebræ, with their vessels and other soft coverings, sharp and angular enough to do it. I should be very glad to know if this idea is in any way confirmed or disproved by the observations of others.

SYMPTOMS

External bruising is often absent. Shock and collapse may be absent early, but rapidly supervene. (Case 1 was unconscious for fifteen minutes.) Pain is constant and progressive. Tenderness is always marked in a short time. In case 3 it was reported absent the first twenty minutes, and then severe. Vomiting is constant, becoming fæcal, but not always a very early sign. Rigidity of abdomen, rather than distention or marked tympanites, appears early. Leucocytosis is too late a sign to be waited for. If other symptoms point to rupture of the bowel, we need not wait for a blood count, and especially not for a series of hourly counts.

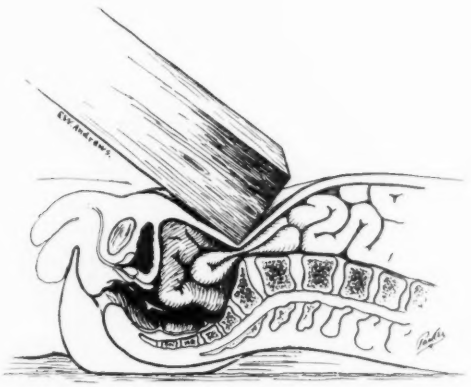

Fig 1. Bowel driven back upon promontory of sacrum, or "sacrovertebral angle," showing probable shearing or cutting action of this bony ridge.

Accumulation of serum mixed with fæces causes dullness in dependent parts, or may be wholly absent. The diagnosis may rest only on the history of severe blows upon the abdomen, with signs of shock and depression without very characteristic local signs. This would be after the bladder and kidneys have been found uninjured by the absence of bloody urine. The kidneys, or, more commonly, one kidney, the spleen, and the liver are often lacerated by blows and falls, giving signs for the most part like those of severe hemorrhage. The bladder and urethra, when torn, are nearly always associated with fractured pelvis.

In the absence of any of these injuries, a patient suffering severely after a hard blow on the abdomen may be suspected of having a ruptured bowel, and opened early on suspicion. Injuries to the solar plexus and ileus of paralytic or nervous origin will not increase progressively, but tend to diminish after the first shock.

INDICATIONS FOR OPERATION

These are absolute the moment the diagnosis is made. There is no alternative or conservative treatment permissible.

TECHNIQUE

Many points in the operation for rupture, i. e., the search, washing out, etc., are the same as in gunshot and stab wounds or perforating ulcers. In a little over forty stab and gunshot wounds of the intestine I have evolved a technique about as follows, and find it practically as good for the rupture cases. My experience with the latter has been somewhat limited, except that in 1905 I had the five cases herewith reported. My earlier cases were mostly fatal, being late operations.

TIME OF OPERATION

Let there be no "waiting for reaction." Operate at the earliest moment, even on uncertain data. If in doubt, open the abdomne after severe blows. I have seen several cases lost, and lost them myself, by waiting to be sure.

INCISION

In middle line, large, beginning below navel.

GUARDING THE VISCERA

Let them bulge and float outside. There is no extreme evisceration, as there is no time for great tympanites to have developed in a good case.

CLEANSING CAVITY

Do not wait until the repair is complete and then wash out the peritoneum, but have a two or three point irrigator (see Fig. 2), and heavy metal rose tips, which are inserted into (1) the pelvis of Douglas; (2) below the liver; (3) below the spleen. This will wash both sides of the mesentery, which is a sort of septum in the abdominal cavity. Turn on through this triple-pointed irrigator copious streams of decinormal salt solution at 105° to 110° F. (in the irrigator). It cools somewhat more rapidly if the tube is long and thin. Let this run through the whole operation. Its effect is very stimulating, as well as cleansing, and it helps the pulse.

It floats the small intestines up and makes them protrude a little, but as they are partly collapsed, they are not unmanageable. Let them lie outside, in part covered by cloths, as this enables us to hasten the search.

FINDING THE TORN LOOP

Locate the sigmoid and follow it down and up. Feel and look over the rectum and bladder. Follow the colon and inspect all its parts, except the splenic and hepatic flexures, which

can only be palpated. Pull up the cæcum and make a fair start up the ileum, running it through both hands and never dropping its loops. If this is done once, you will instantly lose the direction of the bowel and have to begin at one end again. The assistant should stand opposite and carefully watch that side of the bowel and mesentery toward him. In case, for any reason, the search begins midway of the bowel, give a loop of it to the assistant to hold carefully. Then follow its whole length in one direction, repeating the search from the point held in the other. When the upper end is reached, the stomach can be inspected by drawing down the colon, or it can be examined first.

The closure of the rent, if large, should be by Connell's admirable stitch; if small, as in multiple punctured wounds. I run it up rapidly with a continuous suture, not caring whether it be a Lembert or Czerny, and then, with the same thread, run back, burying the first row. In this way the work is rapid and perfectly safe. In multiple perforations, the assistant and surgeon should each have threaded needles and work simultaneously.

The peritoneal cavity will now be clean. As much as possible of the fluid should be left inclosed. Drainage should be dispensed with when we dare do so, which is not always.

I have already mentioned the first two cases of this injury. The last three cases are subjoined in full.

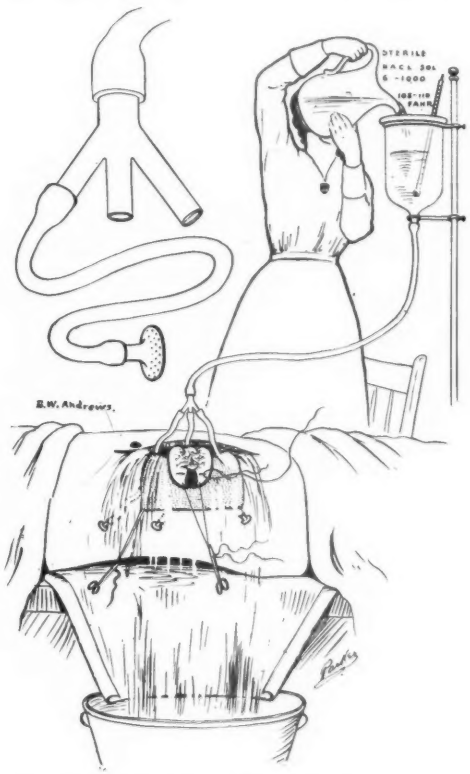

Fig 2. Arrangement of apparatus for simultaneous cleansing and operating. Author's triple-rose nozzles for irrigating during operation.

CASE 1. Frank Lapota, æt. 48, laborer. Entered hospital June 29, 1905, at 7:25 P. M. He said that he had had for some time a small rupture on right side, which protruded a little at times. At noon on the day of admission he was struck on the abdomen with a heavy plank, and was unconscious for fifteen minutes after the blow. After the injury he drank large amounts of water, and vomited profusely each time. He said the vomitus appeared brownish. He had not urinated nor defecated after the injury. On admission at 7:25 P. M., he complained of pain in his abdomen, especially in lower right quadrant.

Examination. Patient very uneasy. Large, tender, irreducible hernia of right inguinal region. Small left-sided inguinal hernia. Abdominal wall tender and rigid. Marked dullness in lower part of abdomen, extending half-way to umbilicus. This remained after catheterization. Flanks dull, and the dullness shifts somewhat with change of position. Liver dullness slightly obliterated at lower margin. Hernial mass dull on percussion. Splenic dullness continuous downward into abdomen. *Catheterized urine:* No red cells. Pulse 122; temperature 98°; respirations 40.

Treatment. Operation by Dr. Andrews. Assistants, Drs. Foreman and Meyers. A long median incision was made. Yellow fluid filled the peritoneum. The endothelium was not abraded or reddened much. Irrigation by deep tubes went on while the search for the rupture and its repair were in progress. Before this was finished the salt solution came out clear. All parts of the bladder and colon accessible, and then the small intestines, beginning at the cæcum, were passed in review, and a transverse rupture of the ileum found about four feet above the valve. This included almost the whole circumference of the bowel. The closure, practically a circular enterorrhaphy, was done with the Connell stitch, and the abdomen closed with drainage by multiple gauze strips.

The patient took a bad anæsthetic, and was stimulated heavily — strychnine, digitaline, and salt solution per enema continuous for forty-eight hours, and intermittent later.

Second day. Leucocytes, 16,000. Vomiting frequently.

Third day. After vomiting, a loop of small intestine with tube and gauze drain came out. This reduced easily after removing a stitch. New suture, fresh gauze, and tube. Pulse 104; temperature 99.4°; respirations 28.

Fourth day. General condition good. He was bright, interested in his surroundings; color and expression good. Respirations rapid and costal in type. Vomited at frequent intervals, but easily. The vomitus contained considerable bile. Slight cough. Few sibilant râles in upper right chest. Dressing soaked with thin, watery, turbid fluid. Patient absorbing all of the normal salt enema, part reappearing as urine, but the larger part excreted as vomitus. Whisky and beef-juice added to the salt solution. Some albuminuria.

Seventh day. Some thin discharge from peritoneal cavity. Abdominal tenderness disappears. No tympany. Patient wants to get up.

Eighth day. Vomiting and singultus now ceased. No pain. Abdomen flat and not tender. All drains removed, save one. Some discharge. Wound narrowed by one stitch.

Tenth day. All drains out, and small one inserted. During this time temperature ran to 99.4° daily; pulse 90 to 100; respirations 26 to 28.

Twelfth day. All drains left out.

Thirteenth day. All sutures out. Liver dullness replaced by tympany as far back as anterior axillary line.

Patient discharged well, August 11, 1905.

CASE 2. Charles Wooses, æt. 35, laborer. On October 5, 1905, at 6 P. M., fell with an elevator containing three men, at Swift & Co.'s. (One man killed, second received multiple fractures, and recovered under treatment in the hospital.)

This man entered four hours after he was hurt. He had struck on his abdomen over a piece of timber, and complained of pain across his abdomen. He vomited soon after receiving the injury.

Examination on Admission. Abdomen very rigid, and exqusitely tender, especially in lower quadrant. He lies on his left side, with thigh flexed. Flanks resonant. Chest negative.

Urine. Passed ounces voluntarily, and examination of it was negative.

Reflexes present and equal, including the cremasteric. Pupils equal, and react promptly to light.

Pulse 100, very irregular; temperature 100°, in the rectum; respirations, 22.

Treatment. Laparotomy, five hours after injury, by Dr. Colwell, hospital resident, at suggestion of Dr. Andrews. Assistants, Drs. Phemister and Kirtley. The small intestine was found completely torn transversely about a foot and a half from the duodenojejunal fold. The belly was extremely soiled with fæces. This rent repaired by Czerny-Lembert stitch. Abdomen flushed with salt solution. Tube and gauze drainage. The patient took a good anæsthetic, and received camphorated oil and digitaline, 1-100 grains, hypodermically, during the night.

Second day. Abdomen not particularly rigid; little pain. No distention. Wound drainage freely. Tube withdrawn a half-inch. Rectal feeding of one egg, whisky 1 ounce, warm milk 6 ounces, salt 15 grains.

Pulse 96; temperature 101°, rectally; respirations 22.

Third day. Small bits of ice by mouth. Pulse 96; temperature 100.6°, rectally; respirations 22. Wound drainage shortened.

Fourth day. Temperature touched normal in morning, but rose to 99.6° in the afternoon. Milk by mouth.

Fifth day. Tube out and gauze inserted. Temperature normal.

From this time on wound drainage changed daily, and secretion less and less. No elevation of pulse, temperature, or respirations.

Ninth day. Patient propped in bed; angle 30°.

Eleventh day. Removed silkworm-gut stitches. Clothes on twenty-third day.

Further course uneventful.

Patient discharged November 20, 1905. Small area in lower wound not completely healed.

CASE 3. William Givinn, æt. 42, sign-painter. Entered October 27, 1905, at 4 P. M., an hour after falling from a scaffolding three stories to the ground.

On entrance there were no abdominal symptoms, but after twenty minutes pain began in his abdomen and gradually increased. At 7 P. M. abdomen very rigid. Patient complained of extreme pain in lower abdomen; was nauseated, but did not vomit.

Catheterized urine. No red cells, but hyaline and granular casts.

(The patient received a compound fracture of the leg, which is now — November, 1905 - keeping him in the hospital. His wound is healing satisfactorily.)

Operation 8:30. Dr. Andrews. Assistants, Drs. Rugh and Willard.

Median incision just below umbilicus. Peritoneal cavity contained a large amount of slightly colored fluid, which contained a few small flakes of mucus. The intestines which showed in the wound were covered with scattered patches of fibrin. The mesentery showed numerous patches of irregularly shaped ecchymosis, and an occasional similar discoloration found on the wall of the bowel.

A systematic search of large and small intestines and stomach revealed a single transverse opening about the size of the index finger, 2½ to 3 feet from the pylorus. There were mushy intestinal contents escaping from it, and considerable of the same was already in the free peritoneal cavity.

The intestinal wound was closed by a Connell suture, and the peritoneal cavity flushed with several gallons of normal hot salt solution, which ran continuously during the operation. The external wound was closed without drainage, inclosing as much of the salt solution as would stay in while suturing the laparotomy wound.

Subsequent course uneventful. Did not have signs of septic peritonitis. This would

indicate that all of the free bowel contents was washed out, and that no invasion of the deep layers with micro-organisms had occurred during the four and a half hour's delay before operation. That such a washing leaves a surgically clean surface, no one will contend, but only that when we wash long enough to get a perfectly clear return flow it is near enough sterile so that the peritoneum can take care of what remains.

As in the case of tubercular peritonitis, I suspect that the hyperæmia incident to our operation and hot lavage helps the bactericidal power of the membranes. Bier has lately shown good results in various infections by his passive hyperæmia treatment. I do not mean to imply that later on, when there are pseudomembrane layers and denudation of the endothelium, we can hope for as much. I never feel and wipe away the membranous exudative deposits in the hope of thus removing infectious matter. On the contrary, this membranous exudate may have protective properties, and may be useful.

The violently inflamed surfaces which they cover may absorb all the more rapidly when denuded. At any rate, peritonitis in that stage, if general, is hopeless, and if only local, can better be tamponaded and let alone.

NORTHWESTERN UNIVERSITY MEDICAL SCHOOL

Department of Surgery

SPONTANEOUS DISLOCATION AT THE HIP-JOINT

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IN using the term, "spontaneous dislocation at the hip-joint," I wish to direct attention to a class of cases where dislocation results without traumatism, and to those cases where there is no true dislocation at birth. I do not refer to the freaks that can voluntarily produce a pseudodislocation and replacement by muscular action.

I do not question the general accepted belief that there are true congenital dislocations—dislocations occurring during uterine life; nor do I question the possibility, and perhaps the probability, that there may be a few cases where the femoral head never was in the acetabulum.

Only a few of the so-called congenital dislocations are recognized until after the child has walked for some weeks, or some months, and some are not recognized until the child has walked for some years. The enthusiastic operators of congenital dislocations have said that congenital dislocations were not recognized early, because they were not looked for, or because the physician did not know a congenital dislocation when he found it. That this is often true, there can be no doubt; that it is not always true, there also can be no doubt.

For ten years I have been keenly interested in the subject of congenital dislocations at the hip. During that time I have had upward of two hundred cases. I have seen cases in infancy where the head of the femur could be distinctly felt in the characteristic position on the dorsum of the ilium, and presenting a positive shortening of the limb, become apparently normal hips without operation. It would be interesting to know how many of the perfect anatomical replacements in children operated upon in infancy were of this class—cases that would have become normal had they been left alone.

I have seen at least one case where there was no evidence of dislocation for three years, until after the child began to walk. Then there have been a number of cases in older children, where one hip presented a so-called congenital dislocation, with a normal hip on

the other side, or at least not a dislocated hip, shown by X-ray picture to be not dislocated, that resulted in spontaneous dislocation of the "normal" hip during the period of walking in the plaster splint after operation on the "congenitally" dislocated hip with the limb of that side in extreme abduction. In other words, there are hips that are apparently normal, that probably would always remain apparently normal under ordinary usage, that spon aneously dislocate when used with the limb in the adducted position.

All this is equivalent to saying, that some hips are apparently never in place; that others are in place during a part of uterine life; that others are in place at birth, but become displaced before the child walks; that others are so defective at birth that they present the evidences of dislocation which later passes off, leaving apparently a normal hip; that there are others that apparently are in place until the child has walked for some weeks and then become dislocated; that there are others that remain in place until used for walking in extreme adduction; and there are others that never become dislocated unless subjected to serious traumatism. Possibly there is still another class that never, under any circumstances, become dislocated; that, when subjected to serious traumatism, sustain a fracture before they will dislocate.

My contention is, then, for a class to be called cases of spontaneous dislocation,—a large class, embracing all those that are not intrauterine dislocations on the one hand, and are not traumatic dislocations on the other.

Baldwin of Salt Lake City has recently written on congenital dislocation of the hip, advising against bloodless replacement and for the cutting operation, on the ground that by the bloodless operation it was not possible to pass the femoral head back through the rent in the capsule through which it had escaped when the dislocation occurred. Now, that is just the point of distinction between a traumatic dislocation and a spontaneous or congenital dislocation. In the traumatic dislocation the capsule is torn and the femoral head thrust out through the rent, while in spontaneous and congenital dislocations the capsule is not torn, at least prior to operation, and the femoral head is still within the synovial sac.

In traumatic dislocations, the reduction, if a bloodless one, must be made very early, if one expects to succeed in leading the femoral head back through the rent in the capsule and place cartilage in apposition to cartilage. One may make a late bloodless reduction of a traumatic dislocation. I have made one as late as three years after the accident, and placed the femoral head in the acetabulum, but with at least one fold of capsule intervening between the cartilage of the head and the cartilage of the acetabulum. To place cartilage to cartilage in old traumatic dislocations, one must do a cutting operation.

In spontaneous and congenital dislocations one may or may not, by bloodless operation, succeed in placing cartilage to cartilage. Generally, I think one does not succeed; generally, there are at least two folds of capsule intervening between a greater portion of the cartilage of the head and that of the socket, but there is an opening, perhaps a small one, where cartilage looks to cartilage, unless an enlarged and elongated ligamentum tires intervenes.

The following cases illustrate the points I have been attempting to make.

In 1902, at my clinic in Northwestern University Medical School, Professor Lorenz operated upon a child under three years of age for unilateral congenital dislocation of the hip. Prior to the operation, no one examined the hip except Lorenz; at the operation no one verified the dislocation, except Lorenz and his assistant. When I removed the plaster splint the femoral head was perfectly in the socket, and has remained there since that time, but the limb is three eighths of an inch shorter than the other limb. I reported this case as a perfect anatomical replacement, one of the two perfect results obtained by Lorenz out of the twenty-nine cases operated by him and observed by me. It may appear from what I have said that I have not entire confidence in the accuracy of the diagnosis prior to the operation, inasmuch as it was not verified by any one but Lorenz and his assistant; and this is true, for these same two operators presented a case of hip disease, at one of the clinics given at Mercy Hospital, as a congenital

dislocation, and went through the motions of reducing a dislocation. The child had been under my care for six months, and immediately after the operation returned to my care, and remained with me until cured. The hip was never at any time dislocated. The manipulations made the diseased joint much more sensitive and painful for a long time.

That Lorenz knew this was a case of hip disease, and not one of congenital dislocation, at the time he operated, I now know, but the audience believed that they saw him reduce a congenital dislocation; the child's mother believed it; the newspapers reported it as a congenital dislocation, giving the child's address; and nothing was said to the house staff of the hospital to indicate to them the correct diagnosis for the hospital records. This circumstance seems to me to be sufficient to warrent a question in one's mind as to the accuracy of Lorenz's diagnosis in the case already mentioned, operated upon at my clinic at Northwestern University Medical School, when later events brought the matter into question.

Kindly bear in mind, then, that I reported this case as a perfect anatomical replacement in the paper which I read, by invitation, before the New York Academy of Medicine early in 1904. Meantime, another child had been born to this mother; she was naturally anxious as to its hips, and in early infancy noted the same condition that had been present in the child operated upon by Lorenz; namely, a slightly shortened leg and a slightly prominent hip. The child was brought to me for examination before she was a year old. I found one limb slightly shorter than the other, one hip-joint somewhat looser than the other, and on this side the femoral head could be felt under the buttock muscles when the thigh was flexed and adducted. I had no doubt that it was a congenital dislocation, but asked that the operation be put off until the child was older and out of diapers. When, finally, the child was brought to me for operation, at about two years of age, there was no dislocation. The femoral head could no longer be felt under the buttock muscles, and the X-ray picture showed it to be in the acetabulum, but the limb was three eighths of an inch shorter than the other, and the child walked with a limp.

Another case of this kind was a child less than eighteen months old, that was brought to me in Des Moines, where I chanced to be operating on a congenital dislocation of the hip. Examination showed a short leg, a prominent hip, and the femoral head under the buttock muscles when the thigh was flexed and adducted. I advised operation, but was refused; the local surgeon himself wishing to do the operation. About a year later I was again operating in Des Moines, and as the local surgeon had not yet operated, the mother again brought the child to me and requested me to operate. The child was anæsthetized, without previous examination, and placed on the table for operation. In attempting to locate the head of the femur preliminary to making abduction of the thigh, I could not find it. The limb was short, but the femoral head could not be felt. I refused to go on until an X-ray picture should demonstrate the dislocation. The X-ray picture obtained a few days later showed no dislocation.

These two cases appear to show that an infant may have a defective hip, a hip so defective that, with the thigh in certain positions, it appears to be dislocated. That such a hip may go on and result in a so-called congenital dislocation, there can be no doubt. That such a case may, on the other hand, go on to become an apparently perfect hip, I am equally certain. Possibly such a hip, later on, may, under unfavorable conditions, spontaneously dislocate, or easily dislocate under slight traumatism.

Many years ago I reported such a case. A heavy and loose-jointed boy of fourteen or fifteen years, living in Brooklyn, New York, was exercising in a gymnasium. While bending backwards with his feet separated and his toes turned outwards, something gave way in his hip. He fell to the floor, but after a short time was able with assistance to walk to his home. He had little pain, but the hip was stiff. He was treated in bed for many months, the diagnosis being hip disease. Then he was sent to me. I made out a dislocation upwards and somewhat forwards. The surgeon who referred him to me doubted my diagnosis, and with others cut down on the joint, and thus confirmed my diagnosis. We all know

that a dislocation at a normal hip cannot occur from so slight a traumatism.

It is well known that most cases of so-called congenital dislocation are not recognized until the child has commenced to walk, and, in fact, has walked for some time. It has been assumed that these cases are really congenital dislocations, and that they were not recognized early because the family physician did not look for a congenital dislocation, or did not know a congenital dislocation when he saw one. Doubtless this is often true, but that it is not always true the following case will demonstrate.

During the period when I was most keenly interested in congenital dislocations of the hip, a female infant, six weeks old, was brought to me with congenital talipes calcaneus and a congenital spinal curvature. Both conditions were so unusual that a very careful examination of the child was made by me and several of my colleagues at the Home for Destitute Crippled Children. No other defects were noted, and I am sure that a short leg or a dislocated hip would have been found had either been present. The child was under treatment for the foot and spine deformities for about three years, being seen once or twice a month. She was a frail little thing, and did not begin to walk until about the time she was discharged. Six months later she was brought again for examination, because of a limp. The limb was five eighths of an inch short, and the femoral head could be felt dislocated on the dorsum of the ilium. An X-ray picture showed the dislocation.

The operation for replacement was very easy. The head was found in the socket on the removal of the plaster splint at the end of eight months, and has remained in place to this day. She walks without a limp.

It is a well-recognized fact that in cases of bilateral dislocation one hip is likely to be found less abnormal than the other, and after bloodless replacement one hip is likely to be a perfect anatomical replacement, while the other goes forwards and upwards to the supracotyloid or subspinous position. In one well-known case of bilateral dislocation which I operated upon in December, 1900, the socket of the left hip seemed a trifle better at the time of the operation than the socket of the right hip. When an X-ray picture was made at the end of the second month, it was found that the right hip had slipped slightly upwards. Treatment on this right hip was discontinued. The result at the left hip was perfect. Twenty-one months after my operation, Lorenz operated on the right hip. When the plaster splint was removed, the head was found "in apposition" to the acetabulum (so said Lorenz), but not in the acetabulum. After a few weeks of massage and manipulation, an anæsthetic was administered, and the limb again manipulated and put in a plaster splint. After the removal of the splint the child still limped, walked with difficulty, and the limb appeared to be shorter than the left. After about ten months she went to Vienna, and was under the care of Lorenz for several months. The newspapers reported another operation; but on her return she still walked badly; and now, at the end of nearly four years from Lorenz's first operation, it is reported that she is again in Vienna for further treatment. The case simply illustrates the result one not infrequently finds in less celebrated cases.

When Lorenz was operating here in 1902, a little girl of some seven years, from Wisconsin, presented with a unilateral dislocation. I examined the child before the operation. Lorenz operated. When I removed the plaster splint at the end of eight months, the hip that had been operated upon presented an anterior transposition of the femoral head, while the unoperated hip presented an upward and backward dislocation, the displacement being at least 1½ inches. The parents refused further treatment.

Some time later, a unilateral dislocation was operated upon by Dr. D. A. K. Steele and Dr. John L. Porter. An X-ray picture was made before the operation, and showed one hip out and the other in the socket. When the plaster splint was removed, it was found that the "normal" hip had become displaced. This condition I verified by examination and by X-ray picture.

One similar case (according to Bartlett) has occurred in Boston, and two years ago, in conversation with Hoffa of Berlin, he told me that he had had one such case. These cases

are conclusive evidence that more or less defective hips may appear to be perfectly normal until used for a considerable period in extreme adduction, and then spontaneously dislocate without the patient being in any way aware of the fact.

A normal hip is not easily dislocated. Several investigators have failed by manipulation alone to dislocate a hip in a cadaver after all the muscles and ligaments had been removed. Some years ago a child was sent to me from the Home for the Friendless. I found a congenital dislocation, and referred her to the Wesley Hospital for operation. I made no notes of the case. An epidemic of measles prevented her from leaving the Home for several months, and when finally she did enter the hospital, I had forgotten whether one hip or two were dislocated, but was under the impression that both hips were out. She was brought before the class for operation without my having seen her, and without examination I seized the limb nearest me and attempted to make a replacement by the Lorenz method. After having used all the force I dared to use, fearing to break the femur, without moving the head one particle, I desisted, and proceeded to examine the case as I ought to have done at first. I found that the hip I had been manipulating was not dislocated; that the other hip was dislocated; and this agreed with the findings by the house surgeon when he admitted the child. The dislocated hip was replaced with half the force I had used on the normal hip.

My conclusions, then, are:

Normal hips do not become dislocated, except through extreme violence, and with rupture of the capsule.

Abnormal hips may become dislocated at any period of life up to fifteen years, and perhaps later, without traumatism and without tearing of the capsule.

I hold that these dislocations without tearing of the capsule should be called spontaneous dislocations, unless it is positively known that the dislocation was present at birth.

NORTHWESTERN UNIVERSITY MEDICAL SCHOOL

Department of Surgery

WOUNDS IN THE URETER: AN EXPERIMENTAL STUDY

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THE following work was undertaken at the suggestion of Professor Weller Van Hook, and carried out in the Pathological Laboratory of Northwestern University Medical School. The work was undertaken in order to study the regenerative activity of the ureter to wounds involving all the coats as follows:

I. Transverse two-thirds diameter.
   A. Sutured.
      1. Continuous: (*a*) silk; (*b*) catgut.
      2. Interrupted: (*a*) silk; (*b*) catgut.

II. Longitudinal, 1 to 2 cm.
   A. Sutured.
      1. Continuous: (*a*) silk; (*b*) catgut.
      2. Interrupted: (*a*) silk; (*b*) catgut.

III. Transverse and longitudinal wounds, as above, without suture.

IV. Special wounds: (*a*) Van Hook; (*b*) Poggi.

This work was to be done at the junction of the middle and lower one third of the ureter. The transverse and longitudinal wounds were each made twenty times and sutured with catgut or silk. The animals were all examined post-mortem, from 2 days to 168 days after the operation, and eight of each operation were fixed, imbedded in paraffine, and cut in serial section. In this way we hoped to see

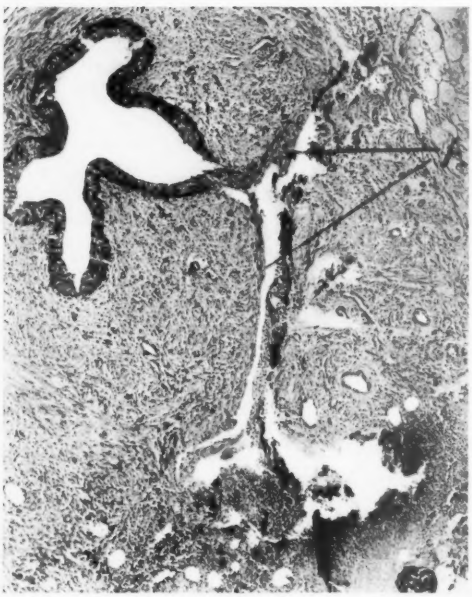


Fig. 1. Section of ureter 48 hours after the operation. A, Epithelium which has grown over the edge in a thin layer two cells thick. Mag. × 47.

the exact changes that occurred, and the time of their occurrence.

In the simple transverse and longitudinal wounds that were sutured, the gross changes in the ureter and the kidney were all about the same. The ureter and the pelvis were dilated, and for the first few days the kidney a little swollen, with indistinct markings. If the ureteral wound was infected, there was always an ascending pyelonephritis.

It was found almost impossible to close a longitudinal wound with interrupted sutures, while with a continuous over-and-over stitch it was comparatively easy. The interrupted stitch was more serviceable in transverse wounds, but here, as in the longitudinal, the continuous suture yielded the best results by preventing leakage, with less constriction. The silk was more pliable than catgut, and could be used in finer quality, so that there was less danger from leakage along the stitches, but it caused the formation of more scar tissue, and was more frequently the cause of kinking.

The histological examination was much more difficult, on account of the suture material. Silk will always tear the sections in cutting especially in the early specimens, where the scar is still soft. Catgut was also annoying in the early specimens, because it became so hard in the fixing and imbedding process that it would also tear the soft tissues and injure the edge of the microtome knife.

Another difficulty that presented itself was the impossibility of telling microscopically from the series whether the wound had been made longitudinal or transverse. There are three reasons for this: 1. Because of the smallness of the tube, and the consequent difficulty of making the incisions exactly correct; 2. The warping caused by the stitch; and 3. The contraction of scar tissue.

The regenerative changes were the most marked in the epithelium. In clean wounds

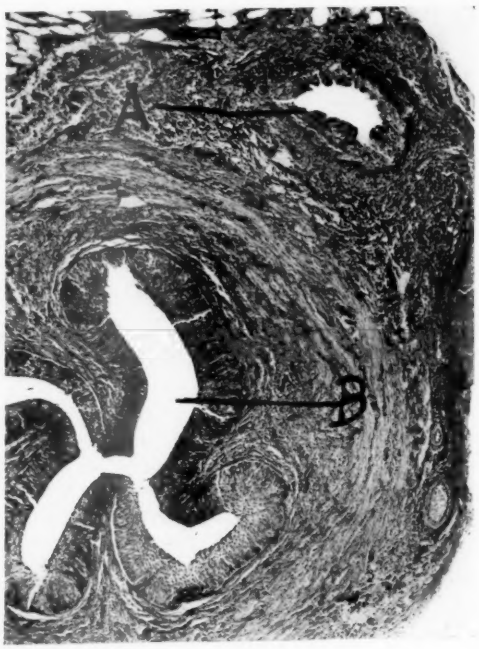


Fig. 2. Section of the ureter 72 hours after the operation. A, Pocket of epithelial cells which has grown out from the lumen B. along the edges of the wound as shown in the following pictures. Mag. × 47.

the epithelium begins to proliferate at the wound edges in forty-eight hours, and on the third day the change is marked. The epithelium extends over the edges of the wound in a thin layer, one or two cells deep. (Fig. 1, A.) On the fourth day it has advanced still further, and is two or three layers deep. This is shown in Fig. 2, A, as a small nest of cells, which the series shows in Figs. 3 and 4 to be continuous with the lumen, B. On the fifth day the epithelium has not only covered the edges of the wound three or four layers deep, but has covered a mass of granulation tissue completely, as shown in Figs. 5, 6, and 7, A and B. In these wounds there is also a papillomatous formation, due apparently to œdema of the submucosa, so that a part is protruded into the canal, and then carried down by pressure of urine or contraction, until it has a pedunculated attachment.

There is also a tendency to the formation of pockets over a wound surface or along a stitch by the epithelium growing over these surfaces, but at times they are in a location where there are no stitches, and where they seem to be due to pressure, which causes the epithelium to evaginate into the œdematous submucosa.

Fig. 3. Shows epithelial pocket at A, as described in Fig. 2. Leading toward the lumen. Mag. × 47.

Fig. 4. Shows a direct connection between the epithelial evagination at A and the lumen B. Mag. × 47.

In Fig. 8 we see a ureter, twenty-five days after operation, with almost normal lumen. On one side of this there is a corrugation with a broad base, A, that can be traced into a distinct papilla, as shown in Fig. 9, A. In Fig. 10, A, the papillary condition is shown perfectly, with an island of connective tissue that is covered with epithelium, B, which is a papilloid growth cut below the stem.

In Fig. 11 we see the same condition as in Fig. 10, with the addition of a bridge of connective tissue, O, and epithelium, A, which forms two lumina; one is true and the other false, being formed around silk, which we can still see as highly refractile fibers, C.

Fig. 12 shows the bridge more marked, and a pocket of epithelium in the bridge itself.

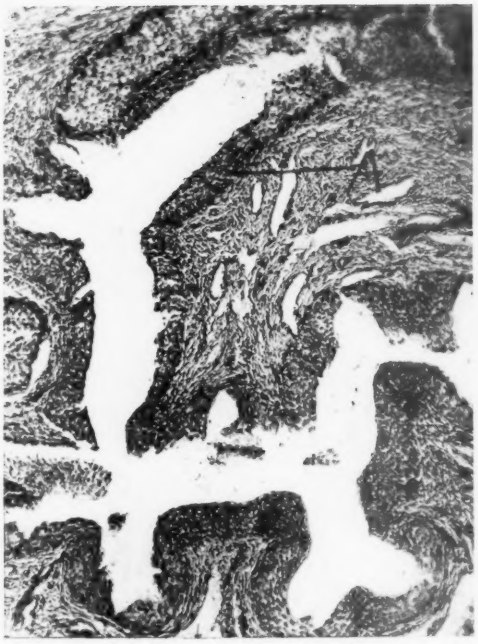


Fig. 5. A wound of five days old in which the beginning of the wound is shown at A. Lumen of the ureter which is above the site of operation almost normal. Mag. × 47.

Fig. 7. Shows the connection between the epithelium at A, which has grown out over the edges of the wound with the lumen B. A continuation from Fig. 5. Mag. × 47.

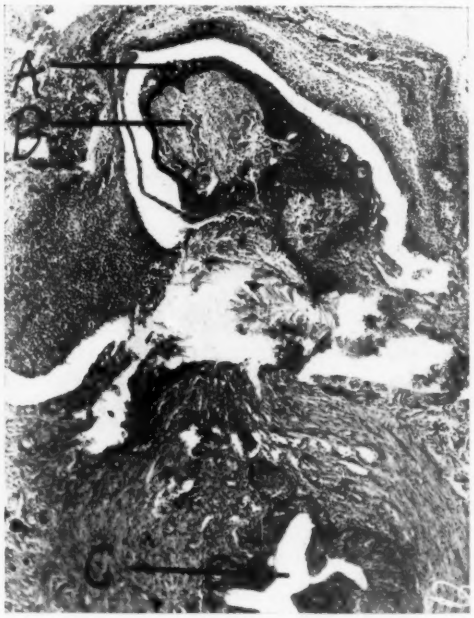


Fig. 6. Continuation of series begun in Fig. 5. Shows epithelium at A, which has grown around a blot clot B. The connection with the lumen at C, broken by silk. Mag. × 47.

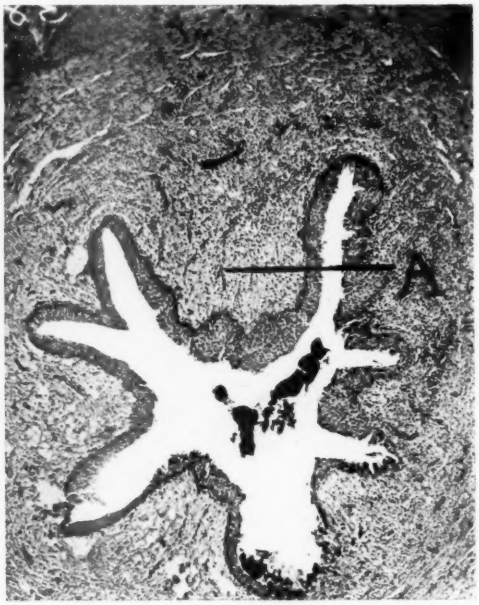


Fig. 8. Section of ureter 25 days after operation. A shows a corrugation of the broad base which is shown in the following series to develope into a papillary growth. Mag. × 47.

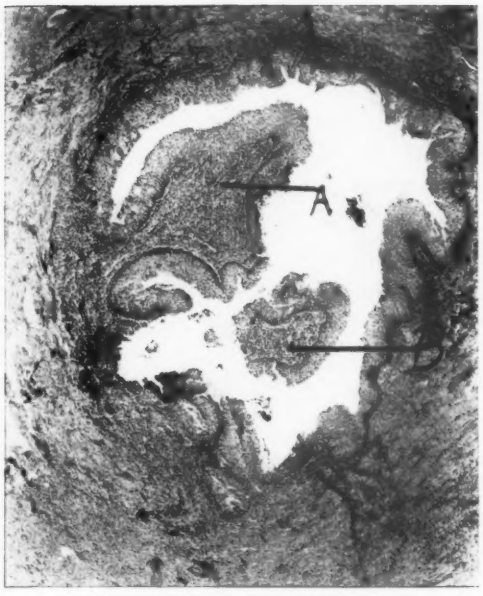


Fig. 9. Section of ureter 25 days after operation showing development of a papilla A, and an incomplete island at B, which is a papillary growth cut below the stem. Mag. × 47.

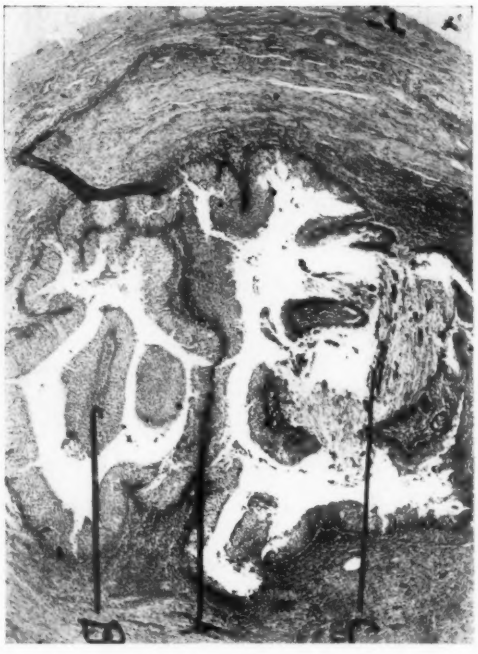


Fig. 11. Series 25 days after operation. A, bridge of connective tissue and epithelium which forms two lumina. B, true lumen with an island. C is a false lumen around silk with islands as in B. Mag. × 47.

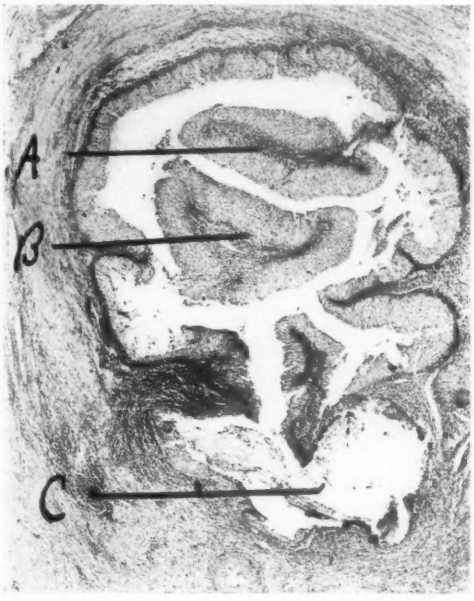


Fig. 10. Series 25 days after operation. Papillary formation is marked at A. B, shows distinct island of connective tissue surrounded by epithelium. C, silk fibres with new lumen beginning to form. Mag. × 47.

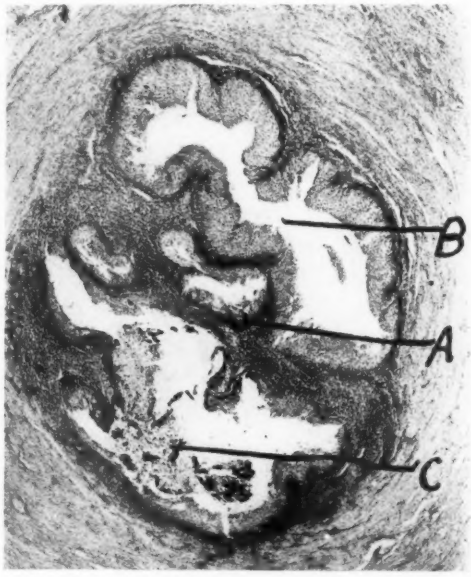


Fig. 12. Series 25 days after operation bridge of epithelium and connective tissue is more marked with an epithelial pocket in the bridge itself, at A. The true lumen is at B. False lumen around silk at C. Mag. × 47.

In Fig. 13 we have the lumen filled with a mass of rapidly proliferating epithelium on these connective tissue pedicles that looks like a true papilloma. This was taken forty days after the operation, in which a simple wound was made and sutured with silk. A few of the threads can be seen in one corner.

In those wounds left to drain without sutures — "through a retroperitoneal lumbar incision" — the healing occurs in the same manner as those sutured, when it is possible to keep the wound clean. All the wounds, clean or septic, healed in from two to three weeks. A large amount of fibrous tissue was always found around these wounds. The characteristic epithelial changes take place here as in other wounds, as shown in Fig. 14, A, B, and C, fifty-six days from operation.

In septic wounds the most marked changes was also in the epithelium, which, as a rule,

Fig. 13. Section of ureter 45 days after an operation. True lumen is at A. B, Papillomntous formation. C, Silk fibres. Mag. × 47.

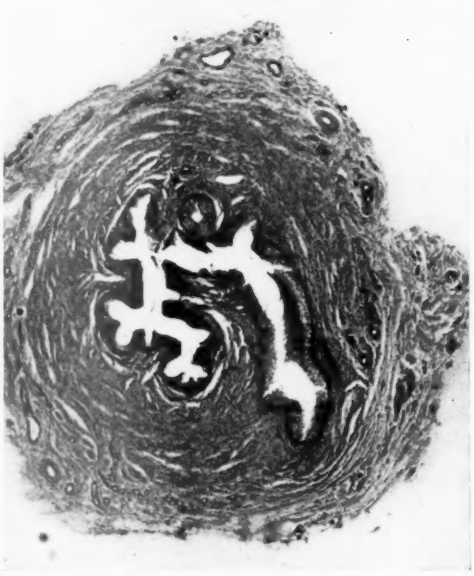


Fig. 14. Wound of the ureter 56 days after making, in which no sutures were used. Primary wound closed 18 days after operation. Same epithelial changes are shown here as in other wounds. Mag. × 47.

Fig. 15. Section of an infected wound of the ureter, 48 hours after the operation. Epithelium is completely desquamated. Few pieces shown at A. Mag. × 47.

was desquamated completely, as shown in Fig. 15, A, a two-day wound.

In Fig. 16, A, a seven-day wound, there is still a small piece of epithelium attached to one side that has not shown any signs of proliferation.

In Fig. 17, a fourteen-day wound, there is some proliferation, but it is scanty, and the lumen is filled with some foreign material. In the later wounds we could not be sure whether they had been septic or not. The kidneys of all these septic specimens showed a pyelonephritis.

The special operations were observed carefully in serial sections.

First, the Van Hook method of telescoping the proximal end of the severed ureter into an incision into the side of the distal portion and fixing it there with three sutures, one at the proximal end and attaching it to the side of the lumen, and one at each edge of the incision in the distal portion, to attach it to the side of the proximal telescoped portion, leaving the distal end lying to the side ligated.

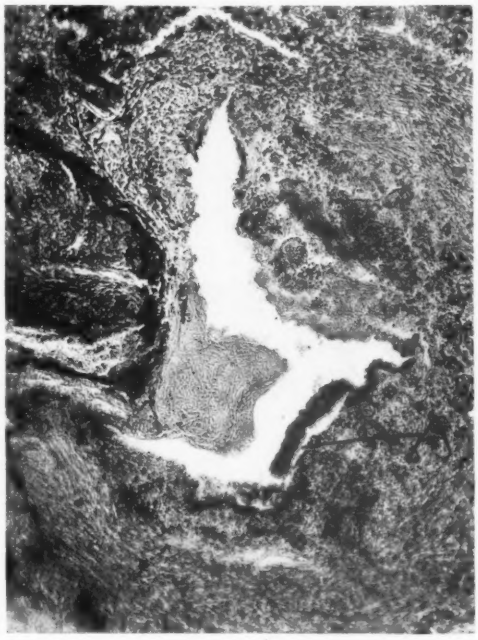


Fig. 16. Section of an infected wound seven days after operation. Small piece of epithelium still adherent to base at A. But no effort at proliferation is shown. Mag. × 47.

Fig. 17. Section of an infected wound fourteen days after operation. There is some proliferation around the sides as at A, but it is scanty, and atypical. Mag. × 47.

The serials were made from above downward. The photomicrographs show the changes in an eighteen-day specimen, which are characteristic of the other series.

Fig. 18 shows the ureter as it enters the incision, with a firm adhesion around the adventitial coat, A, while below leads a part of the distal canal, in which the epithelium is still intact, B. In Fig. 19 we find the invaginated tube with a normal lumen, A, and the adventitial coat almost surrounded with epithelium, B, that has migrated from the inclosing tube. The lumen of the distal portion can be seen to one side, C.

Fig. 20, same as Fig. 19. Figs. 21 and 22, proximal tube, A, surrounded by epithelium, and its adventitial coat has taken on some of the characteristics of the submucosa, B. Dis-

Fig. 18-26 represent a series of Van Hook's end to side anastomosis. A, adhesion of the proximal tube to the side of incision in distal tube. B, lumen of distal tube bent to the side. C, silk thread. Mag. × 14.

Fig. 19. A, proximal tube with normal lumen surrounded by distal, and the epithelium from the distal portion has covered the adventitia of the proximal at B. C, lumen of the distal portion turned over. D, silk torn out in cutting Mag. × 14.

Fig. 20. Epithelium around telescoped tube is more marked.

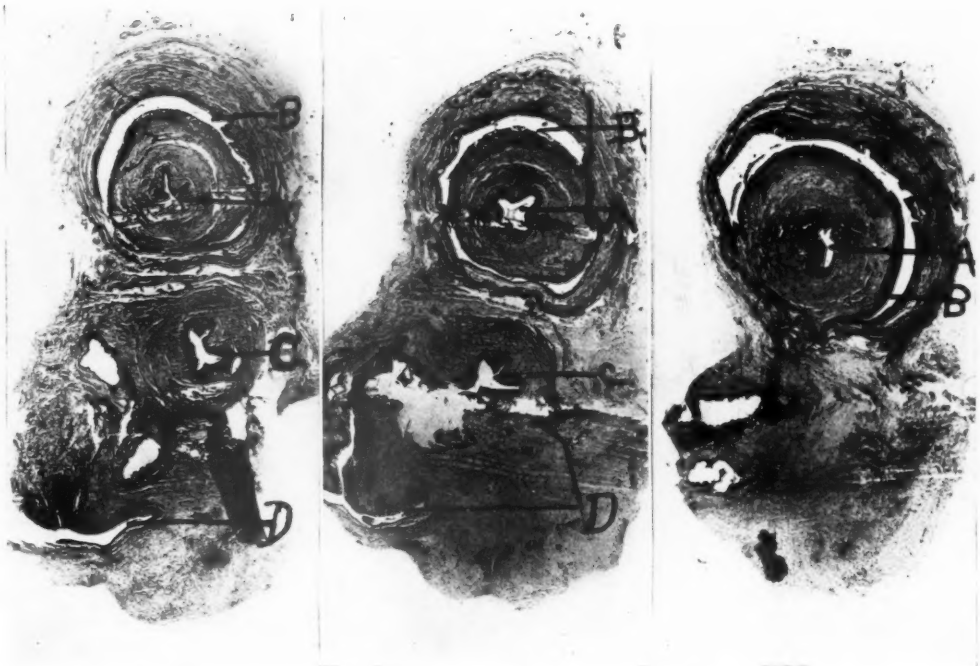


Fig. 21. Van Hook's operation proximal to A is completely surrounded by the distal tube, and the adventitial coat has the character of submucosa. End of the distal tube can be seen at C. D is an epithelial pocket. Mag. × 14.

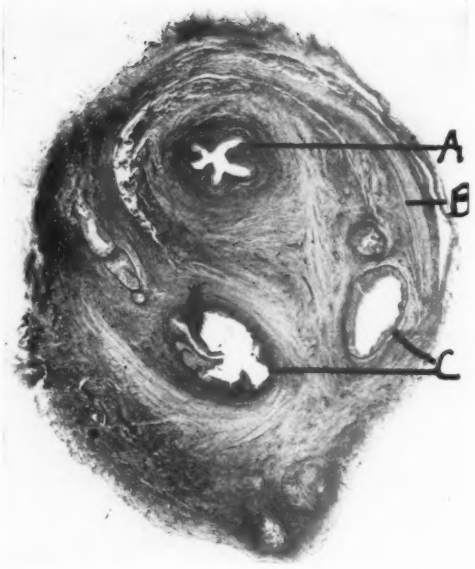
Fig. 22. Practically the same as Fig. 21, except that the distal portion at C is almost lost. Mag. × 14.

Fig. 23. Here the arrangement is the same except that the distal portion has disappeared. The series having passed its lower extremity Mag. × 13.

Fig. 24. Lumen of proximal tube A is a little constricted. Walls thick and the lumen around the tube at B is smaller because of adhesions due to lower stitch on opposite side. Mag. × 14.

Fig. 25. Proximal tube here appears only as a papilla in an almust normal lumen. Mag. × 14.

Fig. 26. Tube here is almost normal with a corrugation to mark where the proximal tube ended. B, silk. Mag. × 14.



Figs. 27-32 show a series of the Poggi operation seventy days after it was performed. A is the proximal tube surrounded by the distal; lumen is almost normal. The distal tube, B, is dilated, and there are pockets of epithelium at C. Mag. × 14.

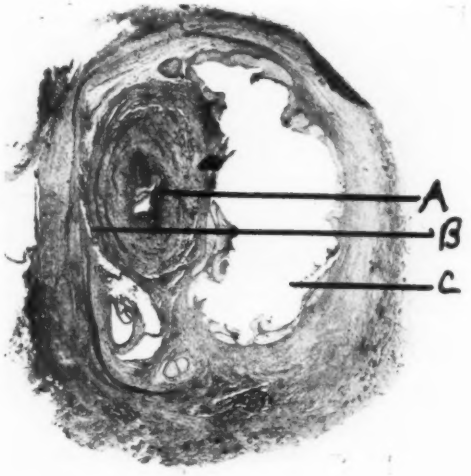


Fig. 29. Here the proximal tube A is fixed at the dista B, and the epithelial pockets at C are much larger. Mag. × 14.

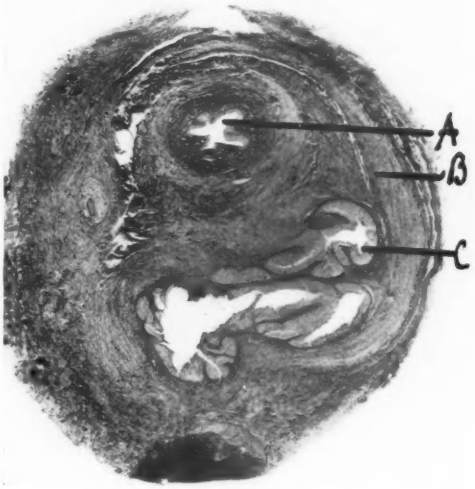


Fig. 28. Poggi. Much the same as in Fig. 27, except that the pockets of epithelium at C, between the distal and the proximal tube are much more marked, and there also appears a line of separation at B. Mag. × 14.

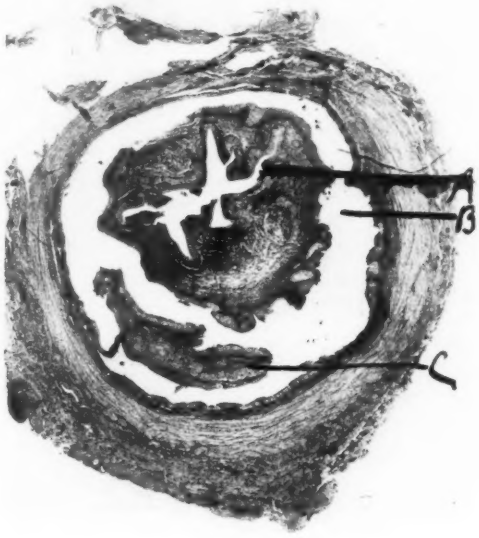


Fig. 30. Here the proximal tube A is free in the lumen B, which forms a canal completely lined with epithelium. C is an island of tissue surrounded by epithelium which is a papilla cut below the stem. Mag. × 14.

tal segment still shows at C. Figs. 23 and 24 show where the distal portion is lost, and the lumen takes an almost normal shape. The proximal tube, A, being surrounded by epithelium, B. In Figs. 25 and 26, proximal is lost, and only shows as a papilla, A.

In the Poggi, in which the proximal is telescoped into the distal, with a stay-suture to hold the apex of the proximal to the side of the distal, and two sutures joining the distal end to the side of the proximal, we see the same changes in the healing. The first picture (Fig. 27) shows the proximal tube (A) surrounded firmly by the distal tube (B), with pockets of epithelium (C) around one side. Fig. 28 is much the same, with the pockets (C) more marked. In Fig. 29 the proximal is almost surrounded by the epithelial pockets (C). In Fig. 30 the proximal, A, surrounded completely by mucosa, B, hangs free, and the muscularis is very much atrophied. In Fig. 31, much the same. Fig. 32, only the tip remains, with a few papillæ at the side.

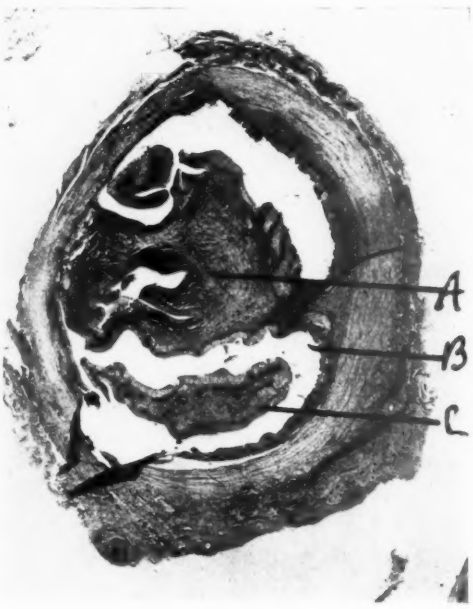


Fig. 31. Here the proximal tube A begins to lose its musculature, and shows where the lower stitch has caused an adhesion to the side B. C, island still marked. Mag. × 14.

Fig. 32. The proximal tube is lost except at A, where it shows as a small island the lumen of the distal tube somewhat dilated. Mag. × 14.

SURGICAL CONCLUSIONS

1. Regenerative activity of the ureteral mucosa is very marked.

2. Muscularis, submucosa, and adventitia regenerate here, the same as in other places.

3. Continuous suture to be recommended in wounds of the ureter.

4. Transverse two-thirds of diameter and longitudinal wounds of the ureter heal without suture.

5. Catgut is preferable to silk, as it leaves fewer scars; less danger of obstruction due to kinking.

6. Sutures of wounds in *small* uterers nearly always cause some obstruction and renal disturbance.

7. A papillomatous formation is usually due to the presence of suture material in the lumen, but not always.

8. Van Hook's method is simpler on account of the shoe-horn effect of the incision. It also gives a wide surface for firm adhesions and causes practically no renal obstruction.

NORTHWESTERN UNIVERSITY MEDICAL SCHOOL
Department of Surgery

CHOLECYSTECTOMY: ITS INDICATIONS AND TECHNIQUE

By WELLER VAN HOOK, A. B., M. D., CHICAGO
Professor of Surgery, Northwestern University Medical School; Attending Surgeon, Wesley Hospital

IT was rather a surprise when it was found that the removal of the gall-bladder left almost no evil consequences. It is true that when the gall-bladder is removed, almost always the stump of the duct, unless the duct is removed squarely at the common duct, dilates to form a sort of new receptacle for the bile, but this peculiarity is of almost no significance. The gall-bladder, then, may be said to be practically of no consequence, and in the absence of special reasons for its retention, may be removed without thought of loss to the economy.

Hence the indications for the removal of the gall-bladder may then apparently be drawn rather widely. We cannot feel with extremists that the sac should be removed whenever stones are found in it, although it must be admitted that inflammation of the walls of the gall-bladder could most easily be gotten rid of by its extirpation of the sac. Nevertheless there are many occasions in practice where the extirpation of a gall-bladder gives excellent results, and where all will admit the propriety of its removal.

First, we think of diseases of the sac itself. Carcinomas demand the removal of the gall-bladder, when by its extirpation the growth can be wholly removed, or when the extirpation of the viscus will make it possible to deal with the growth in a satisfactory manner by some further procedure.

As a rule, the carcinomas of the gall-bladder quickly grow, either by contiguity of tissue or by lymphatic extension, into the liver itself, making resection of that organ a necessary accompaniment of cholecystectomy. Unfortunately, the carcinomas of the gall-bladder are, as a rule, seen so late that their successful removal is not feasible. The present writer has not found a case in which it seemed to him possible to rid the patient entirely of disease by extirpation of the carcinomatous gall-bladder.

Chronic inflammations and acute inflammations of the gall-bladder furnish the most prolific field for properly indicated cholecystectomy. Those inflammations that cause distortion of the gall-bladder, either by dilatation, or, more particularly, by secondary contractures of the gall-bladder, supply the best examples of inflammatory processes demanding cholecystectomy. Where stones are pres-

Fig. 1. Gall-bladder in an acute super-imposed upon a chronic state of inflammation.

ent in the gall-bladder, and especially where they have become imbedded in its walls, or where biliary matter of one kind or another coats the wall of the gall-bladder, the organ may, unless good reasons exist for leaving it, be very appropriately removed.

It is especially, however, where there are malformations and malpositions of the excretory duct of the gall-bladder that excision is indicated, in the absence of malignant disease. For, if stones be removed from the gall-bladder, and if drainage be applied so that the discharges may freely escape, the inflammation will gradually disappear. But a chronic residuum of disease may be indefinitely maintained, unless the excretion of fluids by way of the cystic duct be provided for beyond peradventure. Now, as the writer will show in another paper, it is often impossible to be quite sure that fluids will easily find their way

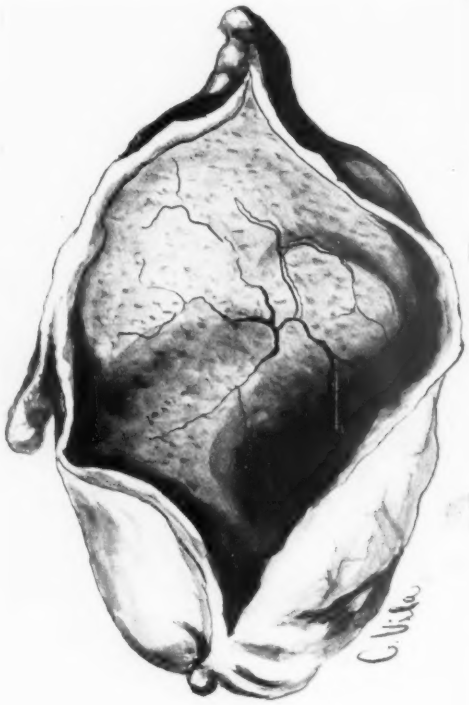


Fig. 2. Dilated inflamed gall-bladder.

Fig. 3. Chronic calculous cholecystitis with retention.

out of the cystic duct after the removal of stones by cholecystotomy, so as to make the return of the disease absolutely out of the question. In such cases of doubt, then, as to the perviousness of the cystic duct for fluids, it is far better to take no chances, and to remove the organ.

There are contraindications against the removal of the gall-bladder that need strict attention. The sac may be required for drainage. It readily may be converted into a tube for the discharge of the bile upon the skin, and in cases where obstruction of the common duct by stricture or by malformation of some other kind prevents the extrusion of the bile in the normal way or to the normal extent, it may be highly desirable to leave the gall-bladder as a permanent drain.

Fig. 4. Chronic calculous Cholecystitis showing retraction and saculation.

And when a cholecystenterostomy is to be done later, or may possibly be required, removal of the gall-bladder constitutes a distinct loss.

In violent infections associated especially with pericholecystitis, one may well question the propriety of adding traumatism to the simple drainage of the parts by the removal of the gall-bladder. In several cases, the writer has desisted from extensive operating under these conditions. A pericholecystitis would be more likely a cause for performing cholecystectomy than mere inflammation of the gall-bladder itself. In several cases the writer has left the gall-bladder when, otherwise, its removal would have been desirable, where the gall-bladder had ruptured, producing infection of the surrounding peritoneum. In these cases recovery took place. In one unfortunate instance, where the gall-bladder was removed after rupture, the patient died from peritonitis, though it was not apparent that the cholecystectomy was the immediate cause of the spread of the inflammation. Nevertheless, the writer's feeling is, that, in the presence of rupture, simple drainage, as a rule, will be found to give rise to a lower mortality than would be the case with cholecystectomy.

The value of cholecystectomy lies in the ridding of the body of a deeply infected sac, — a sac in whose walls muciparous glands are deeply imbedded. These glands may be infected, as has been shown by Emil Ries, to a depth below the level of the muscularis, and drainage is likely to prove ineffectual as a permanent cure for the disease, unless the outlet for the bile along the cystic duct is made so free and so easy that absolutely no accumulation can take place in the gall-bladder.

As remarked already, it is not always possible to provide for this free drainage. Acute infections of the gall-bladder are cut short in a very beautiful way by the removal of the gall-bladder with its contents. The patients in these cases make very rapid recoveries without the annoying discharges of bile to which they are subjected when simple drainage is used.

Chronic infections of the gall-bladder treated by simple drainage are very uncertain of re-

Fig. 5. Chronic calculous cholecystitis.

sult. The distorted sac may take any unexpected shape after the removal of the drainage-tube, with the result that new and deeper inflammations may occur; stones may reform, and the old difficulty be renewed.

But little has to be said about the technique of the operation. With adequate exposure of the parts under the application of a sand-bag three or four inches thick, between the patient's back and the table, the parts are accessible enough to make the removal comparatively easy. The most serious difficulty arises from the separation of adhesions, which may bind the gall-bladder to the liver, to the small or the large intestine, to the omentum, or to the stomach. In the separation of these adhesions all the skill of the practised surgeon may be required, and such cholecystectomies should not be undertaken by the novice.

It is indifferent whether the gall-bladder be removed from without inward or from within outward. In many instances it may be stripped from the liver with ease from without inward. In other cases it will be found easier first to divide the cystic duct and its attendant blood and lymphatic vessels between artery-forceps and strip the organ out from within outward.

Care must be taken that the artery attending the cystic duct be closed by a suture ligature, and one may, if he desires, whip over the denuded hepatic surface. After the removal of the gall-bladder and the ligation of the cystic artery and duct, the application of a gauze drainage-pad between the liver and the omentum, which will have been drawn into position, is, as a rule, sufficient, unless a

Fig. 6. Chronic calculous cholecystitis.

Fig. 7. Chronic calculous cholecystitis with extreme retraction upon the stones.

drainage-tube has to be fastened into position to permit of permanent escape of bile.

The results of cholecystectomy are extremely gratifying in cases where the indications for its use have been clear. My patients usually have made rapid recoveries, and have been almost invariably free from the distress produced in simple drainage by the attachment of the gall-bladder to the peritoneum with attendant adhesion discomforts, etc. The stay in bed is very brief, and the patient soon returns to his ordinary activities.

ON SPONTANEOUS CURE OF CANCER

By HARVEY R. GAYLORD, M. D., and GEORGE H. A. CLOWES, M. D., Buffalo, N. Y.[1]

IN view of the experiments conducted in this laboratory, which suggest the existence of immune forces antagonistic to cancer, it is deemed advisable to bring together the data regarding spontaneous cure in mice affected with carcinoma, and at the same time to see what evidence there is in the literature of spontaneous recovery occuring in human beings. However deep the skepticism may be regarding spontaneous cure of human carcinoma, — and this skepticism is certainly widespread, — there is absolutely no doubt of the occurrence of spontaneous cure in mice with cancer, no less than 101 clearly defined cases having come under our observation during the year just passed. The causes which lead to such cures, and the circumstances attending them, are all obviously of the first importance.

The question of spontaneous cure of cancer in human beings is of still greater interest and importance and although but few authentic cases are to be found in the literature, they acquire an added significance when considered in conjunction with the results on animals recorded in this paper.

MOUSE TUMORS

Experiments on the transplantation of mouse tumors were commenced in this laboratory in the early part of the year 1904. In the autumn of the same year, several tumors, after reaching appreciable dimensions, were found to be undergoing spontaneous retrogression, and eventually subsequent examination showed that they had entirely disappeared. Since that time recoveries from true tumors have occurred repeatedly, and we purpose at this stage to present the evidence thus far accumulated regarding the conditions under which these spontaneous recoveries are effected and the frequency of their occurrence. Very few references to spontaneous recoveries are to be found in the rapidly growing literature dealing with the transplantation of mouse tumors.

Michaelis (*Verhandlungen des Komitees f. Krebsforschung*, h. iii, 1903–04, p. 38), in discussing the results obtained by inoculating Berlin mice with the Jensen strain, mentions the occurrence of tumors which, after reaching the size of a pea, remained stationary, and subsequently retrogressed and entirely disappeared.

Apolant[2] (*Deut. med. Wochenschr.*, 1904, No. 13), in a paper dealing with the influence of radium on mouse tumors, refers to cases of spontaneous recovery, two of which are actually illustrated in the series of control mice. One of these had reached a diameter of four millimeters, slightly above the minimum which we have employed. The fact that Apolant considers that there is no risk of mistaking spontaneous cures for those effected by the radium

[2] The first accurate observation of retrogression of experimentally inoculated tumors was made by Wehr (*Centralbl. f. Chir.*, vol. xv, 1888). This author, in 1883, inoculated a series of dogs subcutaneously with fragments of a medullary carcinoma taken from the vaginal mucosa of a bitch. He used for this purpose small fragments of tumor removed aseptically. Inoculation was not followed by inflammatory reaction. There was during the first eight days no swelling in the region of inoculation, neither could the inoculated fragments be palpated. Later there appeared nodules which grew to the size of beans or hazelnuts in the course of six to eight weeks, after which they remained for some time stationary and then gradually disappeared. A number were removed for microscopical examination at various stages, and showed that the tumors were composed of carcinoma tissue of identical structure with the original tumor. In all of the sections examined he was able to demonstrate in the epithelial cells of the tumors frequent karyokinetic figures. L. Loeb (*Virchow's Archiv*, bd. 167, h. 2, 1902), in the transplantation of sarcoma in rats, observed that in many cases tumors remained stationary and ultimately retrograded. Sticker (*Zeitschr f. Krebsforschung*, vol. i, No. 1, 1904), also, in the course of transplantation of a round-celled sarcoma in the dog, observed spontaneous retrogression of tumors of considerable size.

[1] Report from the Cancer Research Laboratory, University of Buffalo.

rays, when working with tumors which have already reached considerable dimensions, makes it apparent that spontaneous recoveries from large tumors had not, up to that time, been observed in Ehrlich's laboratory. Bashford, in his last report, states that he has observed in some three thousand tumors but one case of spontaneous recovery of a tumor having a diameter of one centimeter. We ourselves had not, previous to the publication of our first communication regarding the activity of the serum of spontaneously recovered mice, observed any cases in which tumors over five millimeters in diameter recovered spontaneously.

In a previous communication, the methods of transplantation have been dealt with in detail. We therefore refer to only them in so far as it is necessay to demonstrate what attempts have been made to render our results strictly comparable from a biophysical standpoint.

With a few exceptions, tumors which have been used for transplantation were carefully weighed and ground in a mortar with either three or four volumes of physiological salt solution (.8 per cent). All large aggregates of tissue which might interfere with the uniformity of the dosage were then removed by means of fine rakes. In all series of experiments in which a comparison was made between the influence exerted by varying sera, chemical bodies, or temperatures on the materials previous to injection, equal volumes were separated into uniform tubes, the greatest precaution being observed to obtain a perfect admixture of the materials before measuring the individual portions. Subsequently each individual mouse in a series received a subcutaneous injection of exactly the same volume, usually about half a cubic centimeter of the macerated cancer mixture.[1]

Up to the present date (January 1st), about 3,500 mice have been employed in this laboratory for the experimental transplantation of a series of tumors. Of this number, by far the larger part — over 2,500 — have received injections of materials derived from the Jensen tumor. Upwards of 550 fatal tumors have been obtained in this series, and, in addition, over 300 mice have shown, at some stage, indications of a possible tumor development. In this latter series 101 cases of undoubted spontaneous recovery from true tumors which had reached such a size and age as to exclude the possibility of experimental error have been collected, and form the basis of the present communication.[2]

That we have been able to tabulate these results and demonstrate the occurrence of such a large proportion of spontaneous recoveries is owing to the fact that we very early adopted a system of identifying the individual members of an experimental series and charting each mouse at intervals of five or six days from the date of original inoculation. For this purpose, chart-books are employed, in which the groups are arranged numerically and the individual members of a group alphabetically, and for each individual a series of diagrams is prepared, showing the fore legs, hind legs, nose, and tail. When a tumor makes its appearance on the back of a mouse, it is reproduced in the diagram as nearly life-size as possible and in the location in which it occurs, and as the tumor increases in size and secondary tumors are produced, further chartings are prepared, showing the progress of the tumor growth until the death of the animal occurs.

Upwards of 1,800 mice have been inoculated with the Jensen strain since the adoption of this system, and 711 mice have actually been charted for a shorter or longer space of time. These were distributed as follows: 445 fatal tumors, 400 of which reached considerable dimensions, the remainder being present on animals that succumbed before the tumor had reached any considerable size. There were, in addition, 101 undoubted spontaneous recoveries referred to above. The remaining chartings were cases of questionable spontaneous recovery or those in which the tumor materials ulcerated.

The most remarkable differences in the speed of development of tumors, even in the same series, occur continually. Some tumors

[1] Bashford (Scientific Reports on the Investigations of the Imperial Cancer Research Fund, No. 2, pt. ii, 1905) apparently makes use of small portions of tumor introduced by means of a trocar. He makes no mention of the employment of weighed quantities of material and considering the enormous variation in the composition of any one tumor in various parts, it is evident that even were uniform weights of material employed, the results, from a statistical standpoint, would be in no sense comparable.

[2] Upwards of six hundred mice have been used for the transplantation of a sporadic tumor obtained in this country. A considerable number of spontaneous recoveries have been obtained in this series, but we have not included the results in this paper, owing to the short time which has elapsed since the commencement of work on this series.

have developed so slowly as to permit of the mice having been charted from twenty-five to thirty times, at intervals of six to eight days. Others have developed so rapidly that two or three records of chartings are all that are to be found previous to the death of the animal. By examining these charted records it may be seen at a glance that a large number of the tumors developing in the usual manner in from two to three weeks from the date of inoculation have gradually increased in size until they have reached considerable dimensions, and have then, after remaining stationary for a while, begun to diminish in size, eventually disappearing entirely. In order to exclude all early inflammatory processes which, occurring within a few days after inoculation, may occasionally be mistaken for true tumors, we have, in a previous publication, adopted for a standard of spontaneous recovery the existence of a growing tumor not less than twenty days from the date of inoculation, reaching a maximum of not less than three and a half millimeters in diameter at some stage of its development. ("Further Evidence of Immunity against Cancer in Mice after Spontaneous Recovery," *Medical News*, November 18, 1905.) Several of these spontaneous recoveries have been intercepted at a stage at which no doubt could exist that retrogression had set in. The tumors, when removed, afforded ample pathological evidence of recovery, the details of which will be given later.[1]

We have every reason to believe that the increased number of spontaneous recoveries in our records of the last twelve months, during which we have employed our present charting system, is attributable rather to the improved method of laboratory observations, than to any marked falling off in the virulence of the tumor materials, which have, in spite of intermittent variation, maintained a fairly uniform average. It is interesting to note that whilst only one case of spontaneous recovery from a tumor over five millimeters in diameter was noted in the 105 actual tumors obtained from the first 450 mice inoculated, the apparent yield of spontaneous recoveries has risen since the adoption of the charting system from 18 to 22 per cent. The number of tumors which after reaching a diameter of five millimeters retrogress spontaneously is found to be 66; about two hirds of the total number recorded above, and over twelve per cent of the total number of true tumors which made their appearance during this period. Only eleven tumors are found to have reached a diameter of one centimeter or more before retrogression; rather more than two per cent of the total number of tumors. This figure is still considerably in excess of that given by Bashford, who observed only one case in three thousand.

By measuring the tumors approximately, a very fair degree of accuracy may be obtained in the charting process, especially during the early stages of development. Whilst the tumors are still small, they are, generally speaking, spherical or ovoid in form, and consequently a very fair estimate of the actual cubic content of such a tumor at any stage of its development may be obtained from the diagrams by means of the formula, $d_1 d_2 d_3 \frac{\pi}{6}$, in which the third diameter is assumed to be approximately equal to the smaller of those actually recorded. We have adopted this method of computation in order to estimate the relative speed of development of the tumors of different groups, and also with a view to comparing the progress of those tumors which result fatally with those from which the mice recover spontaneously. It must, however, be borne in mind that such a method of estimating the total cubic content, whilst relatively accurate in dealing with small tumors, is liable to error as the size of the tumor increases, owing to the tendency of the majority of tumors to flatten out over an area, the width of which is considerably greater than the thickness. It should therefore be distinctly understood that in subsequent portions of this paper, where reference is made to the volume of a tumor, it is merely an approximate estimation of the volume in question, and simply employed for comparative purposes, without any assumption that the results exhibit the

[1] Bashford, in his report (page 62, footnote), intimates that our large percentage of spontaneous recoveries might be accounted for by assuming that we had mistaken early inflammatory swellings in the subcutaneous tissue attributable to septic processes for true tumors. We would point out that, simultaneously with the publication of Bashford's report, reference was made in a communication from this laboratory to these early inflammatory swellings, and a provisional standard for the recognition of a true tumor adopted, as follows: "The presence of a growing tumor not less than three weeks after inoculation, reaching at some period of its development a volume of over twenty cubic millimeters."

absolute values; however, for the sake of control, we have frequently made comparisons between the weights of the tumors at autopsy and their volumes as estimated from the dimensions when last charted, and the results have led us to believe that our method of computation affords reasonably accurate results.

After carefully eliminating all those cases to which any possible objection could be raised, we find one hundred undoubted spontaneous recoveries occurring in the course of one year from the commencement of the charting system. On account of space limitations, it would be impossible to give full details regarding each of these cases. We have therefore prepared tables showing the relative distribution according to maximum dimensions reached by the tumors, also showing the relative distribution according to the period of time elapsing between the dates of inoculation and first appearance, and also those of first appearance and maximum size. A few individual cases will be considered separately at a later stage.

I.[1] Distribution of tumors according to maximum dimensions.[2]

Volume of Tumor, in c m.	Number of Cases		
50 and under	25	46	
51 to 100	21		
101 to 150	18	33	
151 to 200	15		
201 to 250	6	11	
251 to 300	5		
301 to 350	1	2	
351 to 400	1		
401 to 450	0	1	
451 to 500	1		
Total under 500	93		
501 to 1000	2		
Total under 1000	95		
1001 to 2000	3		
2001 to 3000	1		
Over 3000	1		
Total	100		

[1] In this and succeeding tables, as stated above, all tumors which failed to reach a minimum volume of twenty cubic millimeters, not less than twenty days after inoculation have been excluded.

[2] It is interesting to note that the average maximum size reached by these cases of spontaneous recovery is over 200 cubic millimeters, or representing approximately a diameter of 7 1/3 millimeters.

An inspection of this table shows a steady decrease in the number of spontaneous recoveries, with increasing maximum volume reached by the tumor. In other words, the greater the dimensions reached by a tumor, the smaller are its chances of spontaneous recovery. Ninety-five per cent of the recoveries failed to reach a volume of 1 c.c., 3 have a volume lying between 1 and 2 c.c., and only 2 above that point. This fact is extremely significant when taken in conjunction with those enumerated in a preceding portion of this paper dealing with human cases. In the case of our experimental mice, having absolute control of our materials and observing the greatest precautions in following the progress of inoculated individuals from day to day, we are obviously able to detect the presence of extremely small tumors at a much earlier stage than would be possiblewere we dealing with human subjects; and seeing that the chances of spontaneous recovery apparently decrease in a direct ratio to the increase in size of the tumor, it is fair to suppose that cases of early spontaneous recovery in human beings frequently escape observation.

For the sake of comparison of the speed of development of tumors which recover spontaneously with others which result fatally, we have prepared two tables, as follows:

II. Showing the distribution of 100 spontaneous recoveries, according to period of time elapsing between date of inoculation of mouse and date of first appearance of tumor.

Period, in Days	Number of Cases
10 and under	8
11 to 20	39
21 to 30	27
31 to 40	13
41 to 50	4
Total under 50	91
51 to 100	6
101 to 150	2
151 to 200	1
Total	100

III. Distribution of 337 fatal tumors, according to period of time elapsing between date of inoculation of mouse and date of first appearance of tumor.

Period, in Days	Number of Cases	Percentage
10 and under	36	10.7
11 to 20	112	33.2
21 to 30	94	27.9
31 to 40	35	10.4
41 to 50	23	6.8
Total under 50	300	89.0
51 to 100	32	9.5
101 to 150	4	1.2
151 to 200	1	.3
Total	337	100.0

These two series represent the spontaneous recoveries and fatal tumors occurring in the same period, and are therefore strictly comparable, and it will be seen at a glance that the figures obtained correspond very closely. In each case the largest percentage of first appearances occurs in the period lying between 11 and 20 days from the date of inoculation, followed by that between 21 and 30 days. From this point there is a gradual fall, only a few isolated cases appearing in each series after 100 days from the date of inoculation. It must therefore be said that, so far as the first appearance of the tumor is concerned, we have no indication of any difference existing between the speed of development of those tumors which result fatally and those which recover spontaneously.

IV. Distribution of 100 spontaneous recoveries, according to period of time elapsing between date of inoculation of mouse and date on which tumor reached maximum dimensions previous to commencement of retrogression.

Period, in Days	Number of Cases
21 to 30	35
31 to 40	27
41 to 50	18
51 to 60	8
61 to 70	4
71 to 80	2
81 to 90	1
91 to 100	2
Total in 100	97
101 to 150	2
151 to 200	1
Total	100

From this table it will be seen that more frequently spontaneous recoveries occur in the earlier periods; a conclusion which is only to be expected if the findings in table I, dealing with the maximum dimensions reached, are correct. The two tables, taken in conjunction, make it probable that the farther the tumor has advanced, that is to say, the longer it has been growing and the greater its size, the smaller are its chances of retrogressing spontaneously.

In addition to the above tables, others have been prepared, showing the distribution of spontaneous recoveries and fatal tumors, according to the periods of time elapsing between dates of inoculation, dates of first appearance, and dates on which tumors reached certain dimensions. Some of these tables have been omitted in order to economize space, but it may be stated briefly that practically no difference exists between the distribution of spontaneous recoveries and fatal tumors with reference to the period elapsing between date of inoculation and date on which a diameter of six millimeters was reached. On the other hand, it would appear from the figures recorded below, showing the distribution of forty spontaneous recoveries and one hundred comparable fatal cases with reference to the period of time elapsing between the first appearance and a diameter of six millimeters, that the development of the fatal tumors is rather more rapid than that of the spontaneous recoveries.

Period, in Days	Percentage of Spontaneous Recoveries	Percentage of Fatal Tumors
10 and under	35.0	56.0
11 to 20	40.0	24.0
21 to 30	22.5	15.0
31 to 40	0.0	3.0
41 to 50	2.5	1.0
51 and over	0.0	1.0

We are not prepared, however, to attach much importance to these figures until they have been confirmed by a much larger series of experiments than has up to the present been found possible. The figures in question are more subject to experimental error than is the case with any other determinations referred to above, seeing that two relatively uncertain dates have to be determined, — that of first appear-

ance and that on which a given volume was reached.

In connection with this rather questionable evidence that the chances of recovery are smaller the greater the speed of development of the tumor, it is interesting to note that when several tumors develop in a given series, some rapidly and others slowly, the yield obtained on transplantation from the more rapidly growing tumors is usually higher than that obtained from the more slowly developing members of the series.[1] The two above facts taken in conjunction would indicate the probability that the more rapid the development of a tumor, the greater is its virulence, and consequently the greater must be the natural immunity possessed by the animal in order that a spontaneous cure may be effected.

To summarize the results of the preceding statistical section, it may be said that the chances of spontaneous recovery diminish with increasing age and dimensions reached by the tumor, the percentage of recoveries falling from 21.7 per cent in the tumors that have not yet reached a volume of 1 c.c to 1.1 per cent in those which have exceeded that size. There is also a certain amount of evidence that the chances of recovery are greater the slower the growth of the tumor, but this point is one on which the statistics are to a certain extent conflicting, and on which further evidence must be obtained before it can be finally accepted.

INDIVIDUAL CASES OF SPONTANEOUS RECOVERY

For the sake of demonstrating the course followed by tumors which have recovered spontaneously, we have included in this report the following reports.

Above each series is found the number and letter of the mouse and over each diagram the date on which the charted record was made. (see Plates I and II.)

The first case, 217A (see Plate I, Diagram 1), a mouse weighing 22½ grams, had the largest tumor so far recorded as recovering spontaneously. It may be roughly estimated to have reached a volume of over three cubic centimeters at its maximum point, and if one considers a cubic centimeter of tumor material as approximately equal to a gram, it will be seen that the tumor actually represented about two fifteenths of the entire weight of the mouse.

Inoculated March 28, 1905, the tumor made its appearance on April 17th, a small spherical mass 3 mm. in diameter being observed in the loose tissue above he right shoulder. This rapidly increased until, on April 27th, a clover-leaf-shaped aggregate made its appearance, which in all probability resulted from the development of a second focus of growth and the prolongation of the first tumor o the left. On the 3d of May a large mass was present on the animal's back, extending from the back of the head, and measuring in its maximum dimensions 25 mm. On May 10th a change was to be observed in the size and shape of the tumor, which still retained a form indicative of the existence of two distinct tumors. On May 17th, only seven days later, a great change was noticeable. The upper tumor had now diminished until its diameter was under 10 mm., whilst the lower tumor had fallen to 6. On the 25 h of May the tumors had still further diminished in size, and might now be readily distinguished from one another. On June 2d the lower tumor, had entirely disappeared. On subsequent dates the remaining tumor rapidly diminished in size, having a diameter of only a millimeter on the 20th of June, : nd probably consisting of a small grain of connective tissue; and finally on the 26th of June no tumor at all was to be observed. The mouse was examined repeatedly without any indications of further tumor development being dis overed, and a subsequent inoculation on September 28th with virulent materials capable of producing tumors in other normal series failed to produce any effect upon this animal.

215C (see Plate I, Diagram 2) is another remarkable illustration of this type of spontaneous recovery from a large tumor. 215C was inoculated on the same date with similar materials and similar dosage to those which were employed for 217A. The tumor made its appearance on the same date on which the tumor was first observed in 217A, and increased at about the same speed, reaching its maximum between May 17th and May 25th, subsequently diminishing in size, and finally entirely disappearing about the end of July. The subsequent inoculation of this mouse failed, as in the case of 217A, to produce a second tumor, both animals being apparently possessed of a very powerful acquired immunity.

212A and 213D (see Plate I), two other members of the same series as those which have been referred to, showed smaller tumors, disappearing in a shorter space of time, but the fact that they were in both cases increasing in size twenty days after inoculation, and reached

[1] See incubation paper.

dimensions of 12 mm. and 8 mm. diameter respectively, considerably above the minimum of 3½ which we have adopted, has led us to include them with many others of the same type in the series of spontaneous recoveries, the tabulated results of which have been referred to above. An examination of the charts shows in both cases a uniform rise to a maximum, and a subsequent fall and final disappearance. It may also be noticed that in each case, on the date on which the main tumor had reached its maximum dimensions, a secondary small tumor had made its appearance, and subsequently disappeared previous to the entire subsidence of the larger tumor. In fact, in the great majority of cases two or more tumors make their appearance at some stage in development, and the speed at which they disappear is usually proportional to their size.

It is remarkable that two out of four of the largest tumors observed occurred in the one series 212 to 219, inoculated on March 28th from 175C, but only 7 out of the 100 spontaneous recoveries tabulated above occurred in this group. The total number of true tumors which made their appearance in this series was 30. The proportion of recoveries, 7 in 30, or 23⅓ per cent, is not, therefore, much in excess of the normal ratio of spontaneous recoveries observed in the entire series.

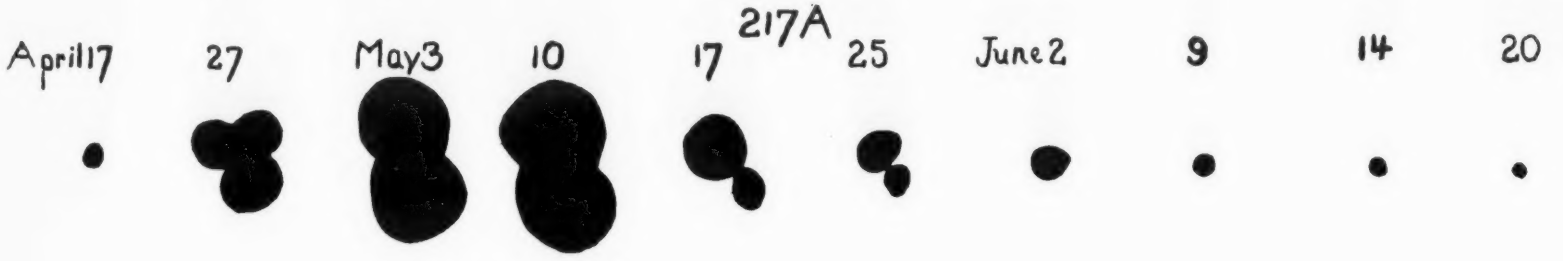
304C, the chartings of which have also been reproduced (see Plate I), comes in an entirely different series from those dealt with above. Inoculated April 26th from 200A, a very virulent strain, it showed no tumor as late as May 10th, but on May 17th a spherical mass 6 mm. in diameter had made its appearance in the back of the neck. This increased rapidly, until on the 31st of May its diameter was 13 mm. In the mean time a secondary small tumor had made its appearance on the right side of the abdomen. From the 31st of May onward both tumors gradually decreased in size, until on June 26th the smaller had entirely disappeared, and finally, on July 14th, no trace of any tumor was left, and further inoculation of this mouse on a subsequent date failed to give a second tumor.

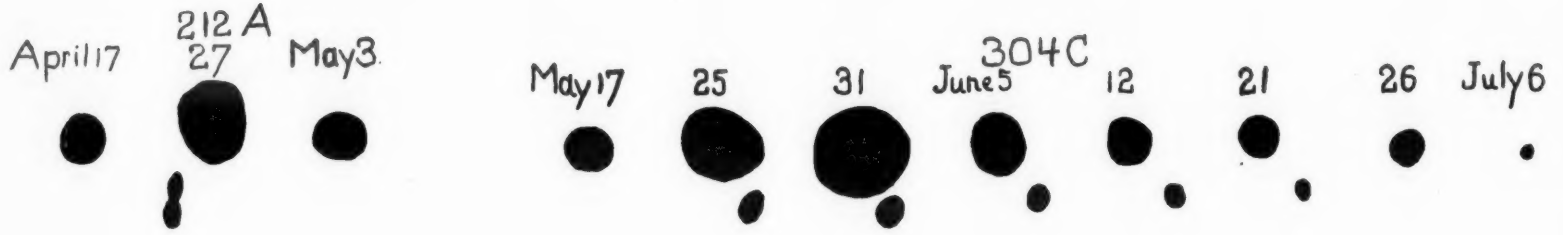
We realize that in those cases in which we allowed the tumor to recover completely, we have no absolute evidence that a true tumor ever existed. When compared, however, with the course of development of those tumors which eventually cause the death of the animals, there can be no doubt in the mind of the observer that we are dealing with true tumors. In order to test the accuracy of our clinical observations, we have at random chosen a certain number of tumors which were in obvious course of retrogression, and extirpated them for histological examination. In all of these cases the histological evidence was conclusive. Final judgment must be based on a combination of these two methods of procedure. The tumors selected for removal and histological examination were 335F, 338A, 421B, and 513F, diagrams of three of which have been included in this report.

335F (see Plate II), a slow-growing tumor, had reached a maximum of 10 mm. 112 days after inoculation, when it began to decrease, and in the course of 36 days fell to a diameter of 2 mm., when it was removed for examination.

Hardened in sublimate, stained with hæmatoxylin-eosin and Borrel. Examination with low power shows the tumor to be surrounded by a well-defined capsule of fibrous connective tissue. One portion of this capsule contains a certain amount of fat tissue and some large capillaries. An inspection of the margin of the tumor shows a well-defined round-celled infiltration, with frequent small capillaries. The structure of the tumor presents in the center the usual characteristics of a tumor of this age, and consists of large alveoli, the margins of which are lined by a cell-complex four or five rows deep. Generally speaking, the centers of these alveoli contain necrotic material. The stroma is well-defined, and shows marked evidence of round-celled infiltration throughout. The epithelial cells present the usual irregularity of outline, deeply stained protoplasm, and vesicular nuclei of this type of mouse tumor. Inspection of the margin of the tumor shows a great variation in the thickness of the capsule. In one aspect of the tumor it is a thin, delicate, but still well-defined structure, its outermost layers consisting of fibrous connective tissue, then a layer of fine fibroblasts intermixed with round cells. At this point the complex of tumor-cells rests directly upon the delimiting capsule. The remaining circumference of the capsule shows, however, extensive round-celled proliferation, and here and there areas of well-defined granulation tissue. At one of the poles of the tumor this granulation tissue is very extensive. It has penetrated into the larger alveoli, and we find small nests of epithelium widely separated from each other by areas of proliferating connective tissue. Here and there we find remnants of the necrotic material from the center of the original alveoli of the tumor. Viewed with low power, the

Plate I.





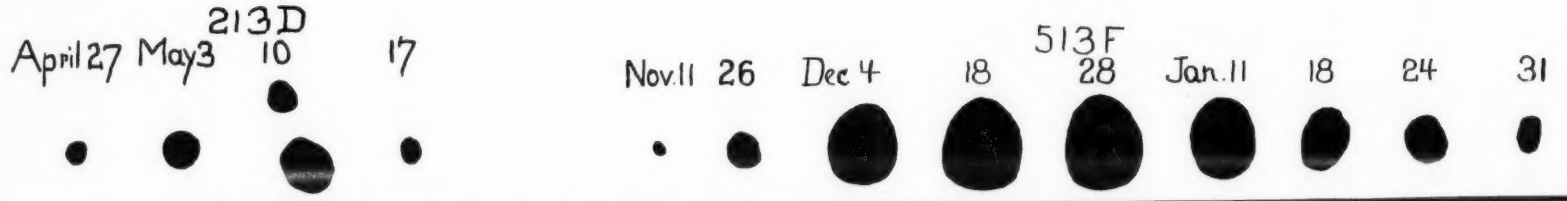


Plate II.

Plate II.

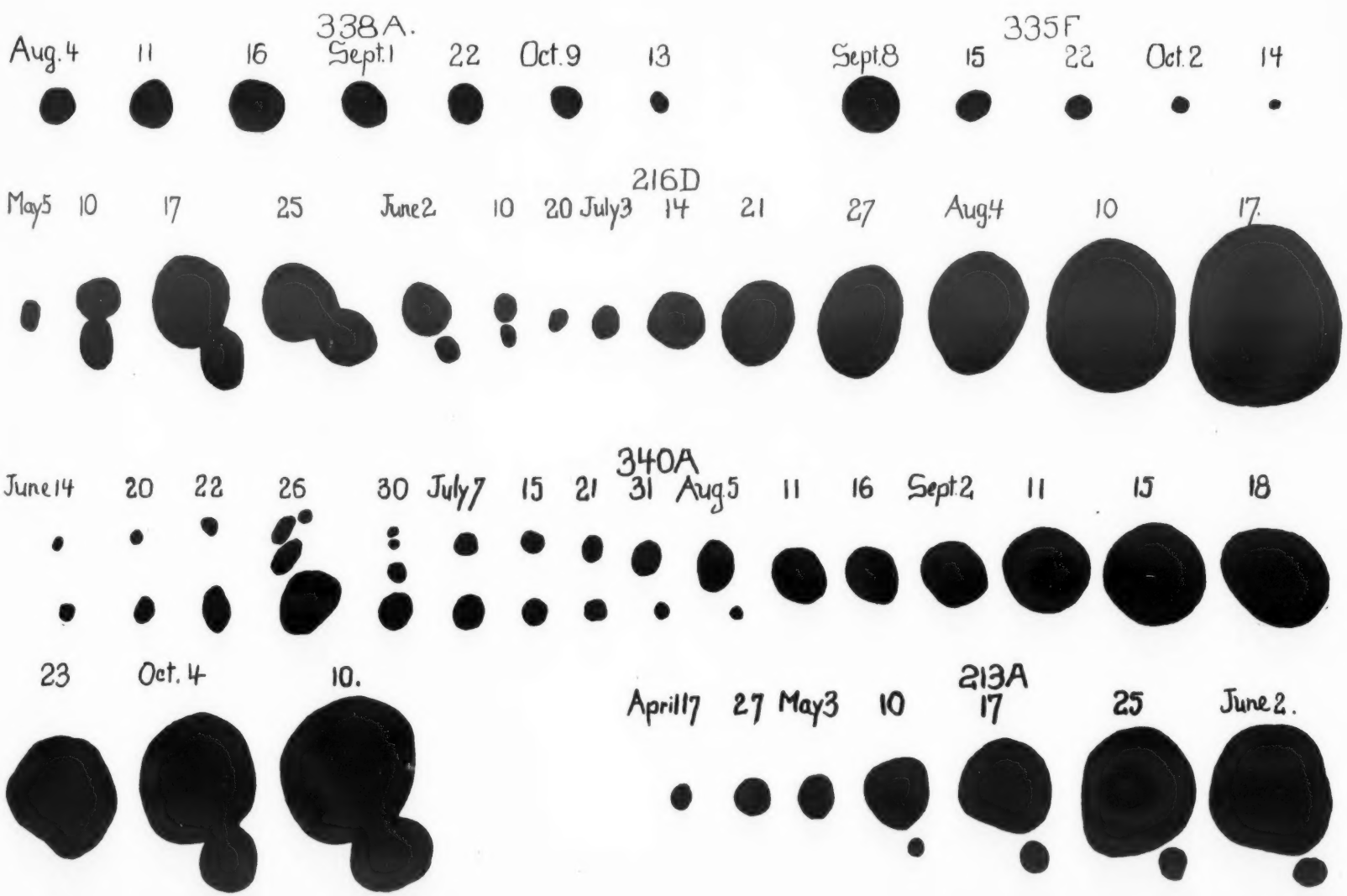

338A.
Aug. 4
11
16
Sept. 1
22
Oct. 9
13
335F
Sept. 8
15
22
Oct. 2
14
216D
May 5
10
17
25
June 2.
10
20
July 3
14
21
27
Aug. 4
10
17.
340A
June 14
20
22
26
30
July 7
15
21
31
Aug. 5
11
16
Sept. 2
11
15
18
23
Oct. 4
10.
213A
April 17
27
May 3
10
17
25
June 2.

Fig. A. Low power. Complete section through rapidly growing implanted tumor. Below and to the left, hyaline detritus, remnants of injected material. It is to be noted that the structure grows in a radiating fashion from this mass. Micro-collinear.

epithelial cells immediately adjacent to the connective tissue in those areas where the nests have been split up appear, as a rule, to be smaller and more deeply stained than the epithelial cells in the centers of the nests. The connective tissue has a plentiful supply of capillaries, and small areas of hemorrhage are frequent. Under high power the margin of the tumor is of the greatest interest. Everywhere we find active proliferation of connective tissue, strands of which penetrate between the epithelial cells. Round-celled infiltration at the margin is very well defined. Where the epithelium is split up into small nests, the cells at the margins of these nest are atrophic, and the chromatin of the nucleus is uniformly diffused through its substance, the nuclei are small and deeply stained; the protoplasm is not stained as deeply as that of the cells at the center of the nest, and is scanty. Occasionally an isolated epithelial cell is found detached near the margin, in which case the nucleus takes the nuclear stain but faintly, the protoplasm has nearly disappeared. Occasional cells are also found about the margins in which the nuclei present characteristic karyolytic changes, the cell presenting the appearance of a remnant of protoplasm with chromatin irregularly distributed through it. Proceeding from the margin to the center of these nests, one finds that the cell boundaries of groups of cells near the margin are frequently indistinct. Here and there a group of several epithelial cells have coalesced, forming the characteristic pseudo giant cells of Beche and Petersen. The cells at the center of these nests are indistinguishable from the characteristic epithelium of the growing portions of this tumor. Karyokinetic figures are occasionally met with in the cells at the center of the nests. Rarely they may be found nearer the margin, but never at the extreme margin. In sections stained with Borrel's method, the connective-tissue nuclei are deep red. The epithelium is easily distinguished from the connective tissue by the orange protoplasm and pale red vesicular nuclei. In sections so stained, the isolated epithelial cells may be readily detected and easily distinguished from the surrounding connective tissue. They are small, the nucleus stains poorly, the protoplasm has nearly disappeared. Occasionally, groups of two or three, forming a pseudo giant cell, are to be observed. Careful search of this preparation fails to show the presence of any typical foreign-body giant cells.

338A (see Plate II, Diagram 1) was a slowly developing tumor which grew to a maximum of 9 mm. in diameter by the eighty-fourth day, when it began to diminish in size, until on the one hundred and thirty-second day it measured 4 x 3 m m., when it was removed, hardened in sublimate, sectioned, and stained with hæmatoxylin-eosin and Borrel.

The tumor is surrounded by a dense capsule, thickest at the poles of the tumor. The area included in connective tissue may be said to be approximately one half of the mass. The centers of the alveoli of this tumor contain extensive areas of typical necrotic material. The alveoli of this tumor are large. One aspect of the tumor is a portion of the skin of the animal, beneath which are strands of muscle, and then the connective tissue surrounding the tumor. There are evidences at the margin that the tumor originally penetrated into the muscle, and we find atrophic muscle fibers imbedded in connective tissue. The outermost layer of the capsule consists of an extensive layer of fibrous connective tissue, in which are groups of cells laden with hæmatogenous pigment. Occasionally, remnants of a nest may still be found immediately within this dense portion of the capsule, and in some cases these are surrounded by aggregations of pigmented cells. The changes at the margin of this tumor may be divided into two classes; viz., isolated nests of retrograding epithelium, and isolated masses of necrotic material. The masses of necrotic material lie nearer the periphery of the capsule than do the isolated nests of epithelium, and appear to be the remnants of larger alveoli from which the epithelium has disappeared, leaving the necrotic material imbedded in the connective tissue. The capillaries in the capsule of this tumor are plentiful, and areas of hemorrhage directly beneath the epithelium, especially into the crevices separating the epithelium from the connective tissue of the stroma, are frequent. From these hemorrhages we may ascertain the source of the brown pigment in the cells of the older portions of the capsule. An examination of the epithelial nests at the margins of the tumor show

Fig. B. Margin of retrograding tumor. Below and to the left, growing epithelium presenting characteristics of that seen in Fig. A. Both right and left, areas of connective tissue marking sites of alveoli, with remnants of epithelium in the connective tissue. Micro-collinear.

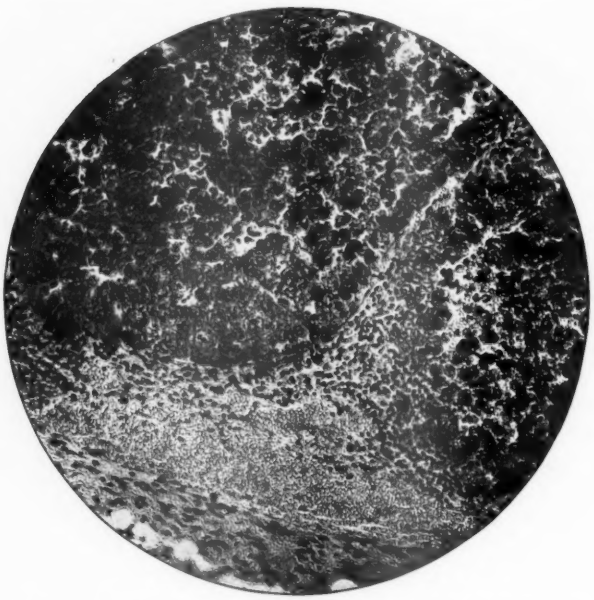


Fig. 1. Margin of retrograding tumor, showing hemorrhage. At margin of lobule at right, beginning atrophy and round-celled infiltration. Magnification 173 diameters.

the characteristic penetration of the connective tissue between the epithelial cells, splitting them up into smaller isolated nests. The marginal cells of these nests show the characteristic atrophy, the coalescence of groups of cells into pseudo giant cells, and at the center occasional karyokinetic figures. An examination of the areas of necrotic material imbedded in the connective tissue capsule show a totally different picture. Here we have at the margins of these masses numerous foreign-body giant cells. These giant cells frequently contain large numbers of nuclei, arranged in the characteristic manner at the margins of the cell or closely grouped at the center. The nuclei stain diffusely and deeply. The protoplasm takes the eosin well, and merges gradually into the protoplasm of the adjacent connective-tissue cells. These giant cells are very plentiful; as many as thirty or forty can be counted about the margins of some of the masses of necrotic material. The connective tissue immediately adjacent to these remnants of necrotic material is of distinctly fibrous character, whereas that surrounding the isolated nests of epithelium is of the younger variety. Under high power an examination of the margins of some of the larger nests discloses the areas of hemorrhage above referred to. Here one sees the red-blood corpuscles separating the connective-tissue structure and extending in many cases between the epithelial cells. The epithelial cells at the margins of these nests where hemorrhage has occurred show very marked atrophic changes. An examination of the relation of these areas of hemorrhage to the epithelium strongly suggests that there is some connection between the extravasation of blood between the cells and the marked atrophy. Examination of the outer portions of the capsule show that the brown pigment is deposited in large spindle and occasionally branching connective-tissue cells.

421B reached its maximum 49 days after inoculation (see diagram), when it measured 7 mm. in diameter, then decreased in size until, 14 days later, it was removed for examination. This tumor was not allowed to retrogress to the extent of those already described.

The tumor is surrounded by a dense mass of connective tissue, in which are imbedded occasional bundles of muscle, indicating that it originally penetrated into the muscular structure. Large areas of connective tissue are found, containing only occasional groups of epithelium. In one portion we have what was evidently a large alveolus in the epithelium, split up into small groups of cells, many of which have coalesced, forming typical pseudo giant cells with connective-tissue fibroblasts, round cells, and occasional capillaries through the entire structure. Isolated nests of epithelium imbedded in the connective tissue are met with everywhere. In the epithelium are occasional karyokinetic figures, and at the center of the tumor characteristic alveoli lined with thick layers of epi-

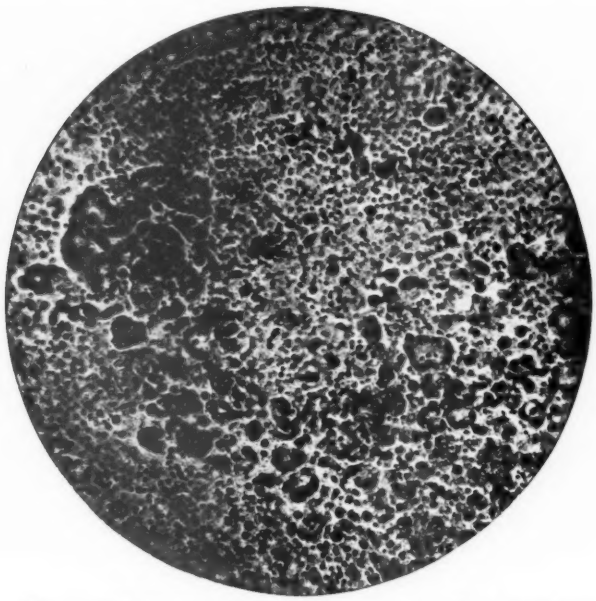


Fig. 2. Disintegrating alveolus taken from retrograding tumor shown in Fig. B. Cells broken up by connective tissue and hemorrhage. Isolated atrophic cells above and to the right. Magnification 173 diameters.

thelium. The connective tissue surrounding the tumor is at least equal in bulk to the remaining epithelial structure. The whole presents the characteristic picture of a tumor undergoing rapid retrogression. There are no isolated masses of necrotic material or foreign-body giant cells.

Tumor 161F (no diagram) is of interest, in that it was the first spontaneous recovery removed for histological examination. It occurred before the present charting system, and we have no knowledge of the exact maximum size of the tumor, but it was about that of a pea. It shows the most advanced stage of retrogression of any of the tumors here described.

This tumor consists of a small nodule about the size of a small grain of rice. Under low power it is found to consist of a connective-tissue structure, at the margins of which are capillaries, the whole surrounded by a delicate, fibrous connective-tissue capsule. Near the center of this mass of young connective tissue are groups of widely separated epithelial cells. In many cases these form aggregates of coalesced cells, presenting the appearance of pseudo giant cells. In many sections there are but one or two groups of these pseudo giant cells. In the sections representing the center of the tumor, one finds somewhat larger aggregates of cells which may be spoken of as isolated nests. Examination of these cells with high power serves to define clearly their nature. They are epithelial cells with characteristic vesicular nuclei and deeply staining protoplasm. In almost every case the cells are broken up into groups of six or eight, the protoplasm of which has coalesced. Occasionally, markedly atrophic cells are seen, sometimes the remnants of pseudo giant cells with one or two nuclei, or occasionally single cells with poorly staining nuclei and scanty protoplasm. In the larger nests there is a distinct suggestion of the original arrangement of the epithelium. There is no doubt that these cells represent the last traces of what was previously a well-defined alveolar structure lined with the characteristic epithelium of the Jensen tumor.

513F (see Plate I), a mouse, which had previously been inoculated unsuccessfully, received an injection for the second time on the 25th of October. A tumor made its appearance on the 11th of November. This tumor gradually increased in size until a maximum of 12 x 15 mm. diameter was reached between December 18th and December 28th. From this point the tumor gradually diminished in size until February 1st, on which date, 98 days after inoculation, a residue measuring 6 x 3 mm. was removed for examination.

Examination of the section (stained with hæmatoxylin-eosin) with low power shows a mass of connective tissue, in which are several large blood-vessels. In the center of this mass are areas of necrotic material surrounded by a wide zone of connective tissue. Under high power the necrotic material presents the irregular outlines of the characteristic masses of necrotic cells in the center of alveoli of the Jensen mouse tumor. In a section stained with Borrel, the masses of necrotic cells are stained green, the surrounding connective tissue blue. This necrotic material is distributed through the tissue in isolated masses, between which are wide zones of connective tissue, the whole presenting the general outlines of an alveolar structure. Careful examination of margins of this necrotic material fail to show the presence of any epithelial cells. Growing betweeen the necrotic remnants of epithelium are characteristic branching fibroblasts, and at the edge frequent connective-tissue phagocytes are seen, with remnants of necrotic material in their protoplasm. At the margin of some of the groups of necrotic cells are found large vesicular cells, the protoplasm of which is necrotic and stains palely, the nucleus of which can still be made out, and contains a certain number of chromatin granules. These are the only remnants of recognizable epithelium. Similar cells are occasionally found imbedded in the connective tissue. In some areas there are considerable aggregations of round cells lying between the large fibroblasts. Small hemorrhages into the connective tissue are occasionally seen. Some of the smaller, more condensed masses of necrotic material are surrounded by dense fibrous connective tissues, and at the margins of these areas characteristic foreign-body giant cells are to be found. This tumor obviously contains no growing epithelial elements. The distribution of the necrotic material in the connective tissue is such as to leave no doubt that it represents the remnants of a growing tumor.

The diagram of 213A (Plate II) has been included as illustrating the course of development of the majority of fatal tumors which usually cause the death of the mice in from six to ten weeks.

In accord with occasional observations in the literature of human cases, we have noted the occurrence of mouse tumors that first increase in size, and after reaching considerable dimensions, retrogress and apparently almost recover, then, after remaining stationary for a considerable period of time, once more increase in size, and after a more or less rapid development cause the death of the animal. 215B, 216D, and 340A illustrate this type of development.

215B (the diagram of which has been omitted on account of its great length) was inoculated March 28th, at the same time as other members of this series referred to above. Two small tumors first made their appearance on the back, in the region of the right hind leg, on the 10th of April. On the 17th of April, five distinct tumors had made their appearance, which remained stationary for a while, and then diminished, two out of the five having disappeared on the 10th of May. On subsequent dates for several weeks, one tumor only was to be observed on the right side, diminishing gradually in size until a minimum was reached about August 4th. About this time, without any apparent cause, the tumor gradually increased in size until when killed on the 29th of September, the tumor was found to weigh 5.75 grams.

216D (see Plate II) is the most remarkable illustration of this type of development.

The tumor in this case was late in making its appearance, being first observed on the 5th of May, 38 days after inoculation. It increased rapidly in size, a second tumor developed on the 10th of May, and on the 17th they were found to possess approximately diameters of 21 and 10 mm. Eight days later, the tumors were found to have retained about the same dimensions, having slightly changed their position, but on June 2d both had markedly decreased in size. On June 20th the lower tumor had entirely disappeared, and the larger tumor had fallen to dimensions of 3 x 2. From this point on a very gradual increase in size was to be observed, following a regular course, eventually causing the death of the animal on August 17th, on which date the tumor was found to weigh 7.6 grams.

340A (see Plate II) is another tumor which shows a remarkable period of retrogression between two periods of development, the latter of which terminated fatally.

The mouse was inoculated on the 26th of May, 1905. Two small tumors appeared on the 14th of June, nineteen days after inoculation. On June 26th the maximum of the first stage of development was reached. There were four distinct tumors (see diagram), the lower tumor being the larger. Between the 26th and 30th of June all of these tumors retrogressed, the smaller one at the top showing the least amount of change. The lower or larger tumor had by this time so diminished in size that in all probability nothing but a connective-tissue structure remained, as is shown by its further fate.[1] On the 7th of July two of the smaller nodules had disappeared, the residue of the larger tumor remained almost unchanged in dimensions, but probably one of the upper two nodules had begun to grow, or the two may have coalesced, as is frequent, forming the new nodule, from which the second period of growth was derived. Eight days later the status was but slightly changed, and this state of affairs persisted until the 21st of July. Between the 21st and 31st, the residue of the larger retrograding tumor had diminished markedly, and the upper or growing tumor

[1] That this is probably the correct explanation is indicated by the results obtained by Apolant in the treatment of large mouse tumors with radium. These tumors decreased rapidly until a certain size was reached, usually about that of a pea, after which they were slowly absorbed, and were no longer affected by the radium, due, no doubt, as Apolant concludes, to the fact that they no longer contained epithelium.

had increased somewhat. On the 5th of August the upper tumor had markedly increased; the lower tumor was stationary. On the 11th, the residue of the retrograding tumor had disappeared, the growing tumor had increased in bulk, and continued to increase steadily until the 11th of October, when the mouse was killed, the tumors at that time having reached large dimensions, as shown by the diagram.

This case presents the apparent paradox of one tumor retrograding when another tumor is growing in the same animal. As will be seen by the histological evidence, in the later stages of retrogression the greater proportion of the residue of the tumor is connective tissue, and the most logical explanation of this phenomenon is that from the 30th of June the retrograding tumor no longer contained epithelium. About this time the immune forces of the animal failed, and the small unchanged nodule began to grow. Just why the larger tumor should have been more vulnerable than the smaller tumors, we are unable to state, but great discrepancies in the resisting power of tumors have been noted in animals, and have been observed in those human cases in which metastases undergo retrogression while the primary tumors are not markedly changed. The retrogression of tumors followed by subsequent growth does not occur very frequently in the mice, only five such cases having been observed in the course of the last twelve months, since accurate charting was commenced. It should be noted that in all five of these cases in which the tumor, after reaching considerable dimensions, first diminished and subsequently once more increased, the tumor had never entirely disappeared, but remained practically quiescent for many weeks before once more starting to devolop. (See diagrams, Plate II, 216D, and 340A). No such recurrences have ever been observed in cases of complete spontaneous recovery from a true tumor. As to what is the exact nature of the forces which enable a small aggregate of cells to resist the action of the normal immune forces which have already resulted in the destruction of the residual portion of the tumor, is scarcely to be determined at present. We have no reason to believe that any external conditions to which the animals were subjected could have exerted such an influence upon their health and general condition as to lower the immunity sufficiently to enable the cancer material once more to develop with fatal results. It must, however, be borne in mind that the age of a mouse is an important factor which cannot be ignored. A tumor covering from five to six months in its development may be said to extend from one period of life into another, in the case of a mouse, the average of whose life is seldom above two years. Also, we are unacquainted with the absolute nature of the immune forces inhibiting the development of tumors and leading to their retrogression, and as to how long they last, and at what age they may be said to exert the greatest influence. It should be noted that all three of these tumors commenced to develop the second time during the warm weather, when, owing to high temperatures, the mortality amongst the animals was increased, and it is conceivable that the vitality or immune forces were on that account considerably diminished. We would not, however, attempt to explain the phenomena in question, but would rather put the results on record, in the hope that they may be of value in connection with future experiments along these lines.

HUMAN CASES

Once aware of the frequency of spontaneous recovery from cancer in mice, one naturally turns to the literature, in search of spontaneous recovery in human beings. There are many cases of this sort in the literature, but very few of those recorded will withstand critical investigation. Many of them are obviously inflammatory lesions, syphilis, or Hodgkins disease, which has been confused with sarcoma. There are others, however, which are, no doubt, true cases of retrogression of carcinoma, but these are unaccompanied by histological diagnoses, which fact renders them useless for critical purposes. Owing to the failure to distinguish between tubercular lesions and cancer, several cases reported in the early literature, which are accompanied by histological diagnosis, must be rejected on that account. The result of our search in this connection has led to the collection of fourteen cases, which, in our opinion, are authentic cases of spontaneous recovery. They include two epitheliomata, one scirrhous

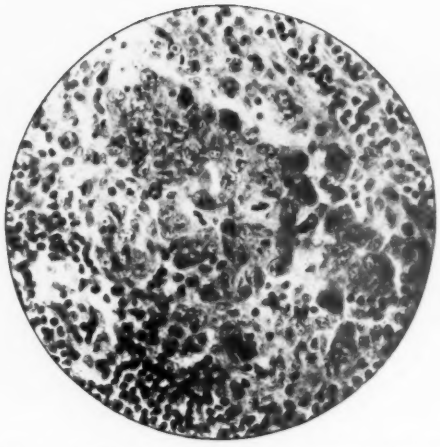


Fig. 3. Remains of a retrograding alveolus, with two karyokinetic figures from retrograding tumor. Magnification 260 diameters.

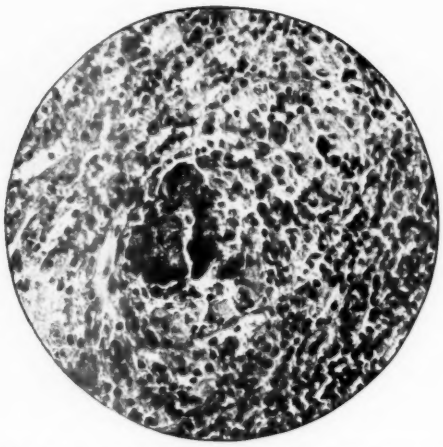


Fig. 5. Pseudo giant cell formed by coalescence of adjacent epithelial cells from retrograding tumor. High dry lens.

cancer of the breast, one malignant adenoma of the rectum, seven cases of chorion carcinoma, one endothelioma, and two sarcomata.

Zur Frage der Spontanheilbarkeit des Krebses bei Menschen mit Demonstration. Senger. *Verhandl. d. deut. Ges. f. Chir.*, 1894, i, p. 171.

Senger first observed that an epithelioma of the

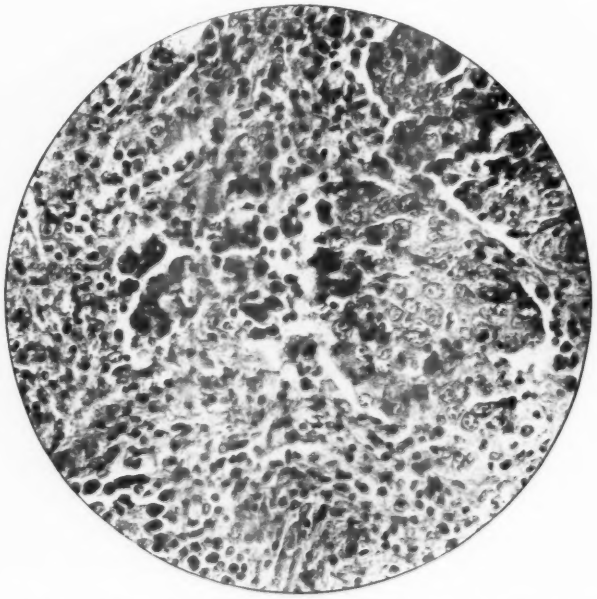


Fig. 4. Margin of a tumor retrograding under the influence of the X-ray. Atrophying epithelium, connective tissue growth, and hemorrhage Magnification 260 diameters.

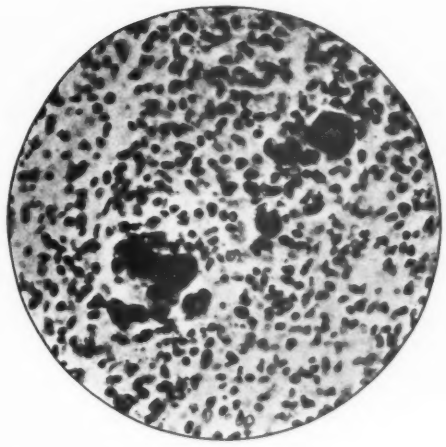


Fig. 6. Last remnants of epithelium imbedded in a large nodule of connective tissue, in tumor 161L. Magnification 260 diameters.

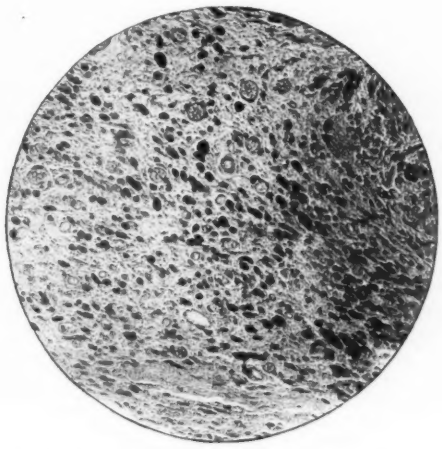


Fig. 8. Connective-tissue cells containing hæmatogenous pigment from the connective tissue surrounding a retrograding tumor. (Evidences of previous hemorrhage.) Magnification 173 diameters.

tongue, which was directly opposite a sharp, decaying tooth, disappeared after the extraction of the tooth. With his attention thus attracted to the occurrence, some time later, when a patient, 42 years of age, with a tumor the size of a cherry on the mucous aspect of the cheek, opposite a decaying molar, presented him-

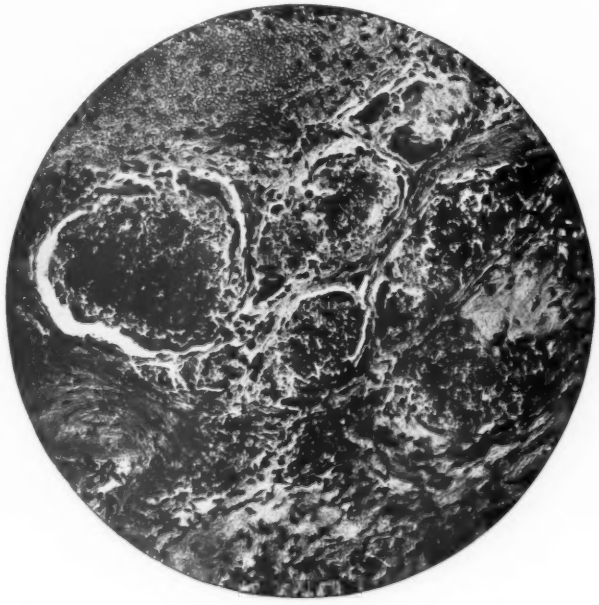


Fig. 7. Areas of necrotic material, with foreign-body giant cells and fibrous connective tissue found at the margin of a retrograding tumor which contained areas of extensive necrosis. Magnification 173 diameters.

self, he determined to extirpate half of the tumor, and after removing the tooth, to see if the remaining portion would disappear. The center of the tumor, where the tooth pressed upon it, was slightly ulcerated. Its margins were elevated, hard on palpation, and infiltrated the margin of the mucosa. The associated left submaxillary glands were enlarged and painful. Patient stated that the tumor had gradually increased in size during the preceding weeks. Half of the tumor and the adjacent muscle into which the tumor had infiltrated were removed at the time the tooth was extracted. The result was as he had anticipated. The remaining half of the tumor steadily decreased in size, and in three or four weeks nothing remained but a scar in the mucosa, and one year later, at the time of publication, there had been no recurrence. Illustrations of the sections of the tumor which accompany Senger's article show a typical epithelioma, with long papillary projections extending into the muscle, and nests of epithelium in the deeper layers of the submucosa. From the illustrations and descriptions there is no doubt that the tumor was a beginning epithelioma.

A case similar to this is the following:

A sore diagnosed as cancer of the lip in early life. Recovery without operation. By R. P. Crosbie, M. A., M. B. *British Medical Journal*, February 11, 1899, p. 338.

Patient, J. N., between 17 and 18 years of age, consulted Dr. Crosbie in May, 1898. His diagnosis was cancer of the lip. He had a diffuse eczematous affection of the lower lip, with a patch of ulceration about the size of a sixpenny-piece toward the right side. The ulcerated surface rested on a raised base, presenting numerous warty nodules. Patient stated that the sore had existed for six months, and that he did not smoke. There was no gland infiltration. The eczematous dermatitis of the lip was probably due to the irritating discharge, or from saliva, bubbles of which always appeared drying at the angles of the mouth. Patient was treated with antiparasitic ointments. Later, these were discontinued, and the condition of the lip grew rapidly worse. An examination was made of the tumor by the pathologist, Dr. More, who pronounced it malignant. Operation was advised, but Dr. Crosbie snipped off a prominent part of the ulcer with scissors, purposely leaving most of the growth, in the belief that it would heal. His expectations were justified, as on January 12th the eczema was cured, the infiltration disappeared, and all that remained at that time was a fibrous nodule, which Dr. Crosbie considered to be cicatricial.

A case of spontaneous disappearance of secondary cancerous growths. By A. Pierce Gould. *Clinical Society's Transactions*, vol. xxx.

M. C., a single woman, a sick nurse, until recently an inmate of the special cancer wards of Middlesex Hospital. In 1885, struck left breast with an umbrella; in 1888 noticed small lump in breast, which slowly enlarged, and in 1890 the mass was removed, and proved, on microscopical examination by competent observers, to be typical scirrhous cancer. In July, 1892, the left axillary glands became involved, and were removed. Later, in 1894, she was admitted to the Temperance Hospital, and was found to have several recurrent nodules around the scar, and considerable dyspnœa. She was considered inoperable, and was sent to the Middlesex Hospital. Her history, in January, 1895, stated that she was then 43 years of age, and for the past year had been steadily failing in health, and had lost considerably in weight. Examined by Mr. Lawson, who found on the left side of her breast numerous nodules involving the skin and subcutaneous tissue, and in the left axilla several hard enlarged glands; above the right breast a linear scar two inches long, in the center of which was a large nodule and in the right axilla a mass of hard glands. Enlarged glands were found above each clavicle. Patient complained greatly of dyspnœa of paroxysmal character; dullness over the base of the right lung, and numerous sonorous and groaning rhonchi on both sides. She continued for some time in a grave condition, with great dyspnœa and abundant expectoration. In December, 1895, somewhat better; winter of 1895–96, again in grave condition. When first seen in 1896 by Dr. Gould, she was unable to recline in bed, cyanosed, suffering from marked dyspnœa, cough, and expectoration, and sputum had contained blood. Many hard nodules in the skin of the left side grouped around the scar, and one larger in the scar above the right breast. Masses of enlarged glands felt in each axilla and above each clavicle. She complained of pain in the left thigh, and on examination it was found that this limb was an inch shorter than its fellow, the great trochanter raised above Nelaton's line, and just below the trochanter the bone was greatly enlarged. In addition to the external recurrent cancerous growths, Dr. Gould believed that she had cancerous growths in the right lung and in the left femur, and he gave an absolutely unfavorable prognosis. On June 15th Dr. Gould examined patient again, and found one tiny nodule in the skin above the left scar. There were no enlarged glands to be felt in either axilla or above either clavicle. Her general condition was markedly improved. The dyspnœa disappeared; she could recline in bed. The dullness in the right chest had disappeared, except at the extreme base behind. The left leg was still shortened, but was less painful. From this period she steadily progressed, gained flesh, developed a good color, and enjoyed life. She now walks with a limp, but can rest her weight on the left leg. The limb is one and a half inches shorter than the right, there is an acute curve forward in the shaft of the femur, just below the trochanter, but there is no enlargement of the bone demonstrable. The right scar is still rather keloid, and its center is thicker than elsewhere. All skin nodules have disappeared, and there are no enlarged glands in either axilla or the neck. She received no special treatment. Gould believes that it is impossible to account for the change in the femur, except on the basis of a metastatic growth below the trochanter, which ultimately retrograded, the continuity of the bone being restored by the usual method of repair.

Polyposis recti-Adenoma malignum-Spontanheilung. Prof. J. Rotter. *Arch. f. klin. Chir.*, vol. lviii, p. 357, 1899.

Rotter describes a case of malignant adenoma of the rectum, which developed in a case of general polyposis of the sigmoid flexure and rectum, followed by spontaneous healing. Patient, Mrs. R., aged 31, entered the hospital September 9, 1895. Following last birth in January, patient had been troubled with chronic diarrhœa, which, in the last six weeks, had been associated with hemorrhage. Examination of the patient showed the presence of a fistula in ano, and about the margin of the anus mucous polyps from a hazelnut to a walnut in dimension. Examination with the finger showed that the entire circumference of the rectum was markedly transformed. The entire lumen was composed of rough, irregular elevations, from the size of a pea to that of a walnut, and at the lower margin numerous polyps, some of them with pendulous attachments which prolapsed through the anus. Between these masses the finger sunk into deep cleft-like depressions. The new growth involving the rectum, as well as the mucous polyps, had a comparatively soft consistence. Portions of the mass were easily detached with the finger, and the examination was associated with mucopurulent hemorrhage. Vaginal examination revealed the rectum as a more or less fixed, definitely palpable tube, the upper limits of which could not be determined. A microscopical examination (Orth) of the portions removed with the finger showed that the fragments were composed of extensively proliferated gland lumina, with here and there a cyst formation. The extensively proliferated epithelium, as well as the connective-tissue structure, showed a marked degree of mucoid degeneration. As the glandular structure was everywhere well preserved, the diagnosis of adenoma malignum was made.

On October 8, 1895, the fistula in ani was laid open with a thermocautery, and on this occasion several polypi, which were removed, proved, on examination, to be adenomata. Condition of the patient—diarrhœa, tenesmus, loss of sleep—strongly indicated the necessity of a radical operation.

For the purpose of determining how extensive was the involvement of the upper border of the rectum, an exploratory laparotomy was performed on the 10th. The exploration showed that the involvement of the rectum extended into the upper third, that both the sigmoid flexure and the colon were slightly thickened, but presented no evidence of tumor. Several polypi the size of hazelnuts, which were detected through the intestinal wall of the sigmoid flexure, were removed through small incisions into the gut. Through these openings it could be seen that the mucosa of the flexure was not as smooth as normal, but was covered with minute elevations. Having determined that the tumor was operable, on October 31, 1895, an extirpation of the rectum was performed. The tumor was found to be firmly adherent, the surrounding tissues markedly infiltrated, because of which, especially at one point, where it involved the posterior vaginal wall, a perforation was unvoidable. Ten to fifteen centimeters of the rectum, including the sphincter, were removed, the gut from above being drawn down and united to the skin. Recovery was without incident. During the end of December a slimy granulation area was developed in the lower portion of the wound, which, during the middle of January, filled in the entire space between the rectum and vagina, and protruded through the perforation into the vagina to such an extent that it developed a mass within the vagina the size of a hen's egg. No new excrescences could be detected above this within the rectum. Because of the inconvenience of this enormous mass, on January 5, 1896, the greater portion was removed with a sharp spoon. The microscopical examination (Orth) of the recurrent tumor showed the same histological characteristics as those of the primary tumor. The growth promptly returned, and both in February and April, had to be be removed by curettage. Promptly following the last curettage, the growth returned so rapidly that she was discharged from the hospital as incurable.

Examination of the extirpated rectum, the lower margin of which was two centimeters from the lacunæ Morgagni, and the upper end fifteen centimeters above. The tumor consisted of masses from the size of peas to that of walnuts, with broad bases, the surface very irregular, and many areas of ulceration and necrosis; between the elevations, deep depressions and clefts, in which no evidence of malignancy could be detected. In the lower portion of the preparation, numerous polyps, the whole presenting the characteristic picture of a soft mucoid carcinoma of the rectum. A section through the rectal wall showed that the muscularis was no longer recognizable; that the epithelial proliferation was surrounded by a mass of scar tissue.

After the discharge of the patient in April, 1896, in July, 1896, she returned to the clinic for examination, and to Rotter's astonishment he found that the large cauliflower growth about the anus had totally disappeared, nothing being left but a perfectly smooth scar. On questioning the patient, it was found that the tumor had gradually decreased in size and had ultimately disappeared.

In considering this case, Rotter points out that the tumor presented all the clinical characteristics of malignancy; the destruction of the muscular coat of the intestine, the infiltration of the surrounding tissues including the wall of the vagina, and the repeated recurrence at the site of the original tumor leaving no doubt in his mind of its malignancy.

Three years later (*Arch. f. klin. Chir.*, vol. lxi, p. 881). the patient died of a metastasis on the surface of the right iliac bone. On microscopical examination of the metastasis, it presented the characteristic structure of the mucoid adenoma malignum which developed in the rectum and which had recurred and finally spontaneously disappeared. An examination of the colon, including the region of the operation, showed a definite, smooth scar at the point where the recurrence had taken place and no evidence of return. The entire colon presented the characteristic appearance of advanced polyposis. A microscopical examination (Orth) of a number of these polyps showed them to be of a benign character. Rotter was of the opinion that the tumor mass on the surface of the right iliac

bone represented a belated recurrence of the rectal tumor. Although he repeatedly points out in his article that benign polyps, such as those which lined the entire colon, frequently underwent malignant degeneration, he was more inclined to believe that the recurrence was from the original tumor than from a possible later degeneration of these benign structures. Patient appears to have been free from recurrence for a greater portion of the three years. He considered the ultimate recurrence of the disease as proof positive of its malignant nature.

Case of spontaneous arrest of growth in an endothelioma, with subsequent inflammatory absorption. B. M. Randolph, M. D. *Proceedings of Pathological Society of Philadelphia*, vol. vii, No. 4.

M. S., aged 43. Three years before operation, patient developed on the posterior aspect of the left forearm, at the junction of the upper and middle thirds, a nodule beneath the skin, which was movable and painless. The mass grew steadily and painlessly for six months, ultimately becoming a flattened slightly elliptical mass $1\frac{1}{2} \times 2 \times \frac{3}{4}$ inches in size. For two and a half years, approximately until two weeks before the operation, it remained stationary. At this time it became painful, and there were signs of inflammatory reaction about the tumor. The tumor was excised. Wound healed by primary union.

Pathological Report. Tumor is beneath the skin, which is not adherent to it. It is not encapsulated. It has an envelope which is derived from the surrounding connective tissue. It presents a grayish white appearance.

Microscopical examination revealed the presence of marked areas of necrosis. Among these are other areas, in which the necrotic process has not taken place. Here the alveoli are filled with medium-sized round cells with round nuclei staining with moderate intensity. No connective-tissue fibers were demonstrated between the cells, and Randolph concluded that the growth was evidently derived from the endothelium of the lymph spaces. The connective-tissue stroma revealed a remarkable phenomenon. There was active hyperplasia with very marked round-celled infiltration. New-formed blood-vessels were numerous. About the margins of the necrotic cell areas were numerous giant cells, sometimes completely surrounding the alveolar spaces. Randolph believed that they were phagocytic.

Two cases of sarcoma, with histological examinations; one from the older literature, 1876, which arouses some doubt as to the diagnosis, the other being perfectly satisfactory. R. Tripier. *Lyon Medical*, 1876.

A. S., 22 years old, gardener. Entered the Hôtel Dieu, June 11, 1875. Examination by M. Tripier, June 24th, showed in the epitrochlear and epicondylian regions of both limbs the presence of a number of small nodules in the neighborhood of the superficial muscular tissue. In the biceps, in the superficial muscular tissue, and in the interspaces, and principally along the sheath of the vessels, a large number of small spherical or ovoid tumors from the size of a pea to that of a hazelnut. The tumors are fairly mobile, slightly elastic, and fairly solid and resistant. Pressure upon them causes no pain. The pectoral muscles of both sides contain a large number of tumors similar to those in the arms. Most of them are deeply seated, but one in the anterior and middle part of the right arm appears to be subcutaneous. The lower limbs are involved to a lesser degree. The disease, according to the patient, appears to have begun in 1874, and led to such pains and muscular stiffness at the time of the onset as to oblige the patient for a time to cease work. The patient was placed upon potassium iodide, but the stomach being unable to tolerate it, its use was suspended. July 27th, patient complained of pain in the side, and had a slight pulmonary hemorrhage. Pulmonary hemorrhages from this time on were frequent, and the tumors in the lower limbs increased in size and number. The treatment of iodide and Fowler's solution was discontinued at this time and cod-liver oil substituted, with some improvement in the general state. Strength and appetite returned. Microscopical examination of one of the specimens, which was extirpated, was made, and the case was considered hopeless. In February, 1876, the tumors had greatly diminished in size, and by April, 1876, only one small tumor the size of a pea could be detected on the internal side of the left arm. The movements were now free. Patient was seen in 1881 by M. Tripier. At this time he was in good health, no tumor having reappeared. M. Morat made the histological examination of the tumor removed from the body of the left biceps. When stained with picrocarmine the section proved to consist of longitudinal bundles of fusiform cells containing one or more nuclei. Many of the cells have extensive prolongations. Blood-vessels are fairly numerous. Tumor was diagnosed by Morat as certainly a sarcoma.

A case of recurrent sarcoma, with apparently spontaneous cure and gradual shrinking of the tumor. By A. Laurie Watson, M. A., M. B., Ch. B., Glasgow. *The Lancet*, 1902, i, p. 300.

The patient, a strong, healthy-looking woman, aged 36 years, admitted to Glasgow Royal Infirmary, November 21, 1900. She was absolutely free from ailment, and came into the hospital because a swelling on the back was annoying her, and she wished to have it removed. The tumor was large and pendulous, being attached to the left side of the back by a base nine inches wide, and rather less than four inches in vertical measurement. The apex hung down for almost four inches below the lower margin of its attachment to the back, while the upper margin was just below the inferior scapular angle. It was soft, but not fluctuant, slightly nodulated, and had the appearance of a lipoma undergoing degeneration; the skin covering the dependent portion was of a dark reddish color. The tumor was regarded as simple, partly because of its character and partly because its history went back to the patient's childhood, though it had grown considerably in recent years.

On November 23d, Dr. D. McK. Dewar, acting for Dr. D. Newman, removed it freely with all the dis-

colored skin, and remarked at the time that in three respects it differed from an ordinary lipoma: 1. The tissue was of a dirty grayish-yellow color, and very friable; 2. It was exceedingly vascular; and 3. Its margins were diffuse and indefinite. After the operation, hemorrhage was so free that the dressings had o be frequently changed in the first few hours; thereafter they were left for four days untouched. On the 27th it was observed that the dressings had become tight, and on exposing the back the tumor was found to be almost as large as before the operation. In the expectation that this might be due to accumulation of blood-clot beneath the flaps, a portion of the wound was opened, but no blood could be expressed, even when a director was introduced and worked about inside the wound. It was therefore concluded that the swelling was due to a rapid re-formation of the tumor. By an unfortunate oversight, the tumor first removed had been destroyed without microscopical examination; but at this stage two small portions of the tissue were removed. One of these I hardened and stained myself; the other was sent to Dr. C. Workman, pathologist to the infirmary. The sections obtained from the first portion were examined by Dr. Newman, by Dr. Dewar, and by myself; and the recognition of sarcomatous tissue, chiefly round-celled, was unhesitating. Dr. Workman's quite independent report described the tissue as a mixed round-cell and spindle-cell sarcoma.

A week later the operation wound had begun to ulcerate along its margins, and it was decided to attempt a wider removal, but when, on December 4th, the patient was placed on the table and anæsthetized, the tumor had attained such a size and was so diffuse in its margins that further radical interference was considered out of the question; the ulcerated edges were therefore cut away and the wound was again stitched up. During the remaining days of her residence in the infirmary the patient looked and felt very weak and ill. A bad prognosis was given, and she was dismissed on the 13th. After this several medical men saw her, and all took a gloomy view of the case; but in spite of everything she improved, and a month after dismissal from the hospital a letter was received from her own medical attendant stating that the operation wound had almost completely healed. When I visited her at her home in the country on February 9, 1901, I reported as follows: "The operation wound has entirely healed up, with only a small scab at its lower extremity, and leaves a firm, healthy-looking cicatrix. The tumor is much less tense than at the time of dismissal, and shows a tendency to return to the pendulous form which it had when first seen; it is flaccid and quite painless. At its anterior margin are some subcutaneous livid patches, which were noticed at the time of the recurrence of the tumor, but these do not appear to have changed at all or to be spreading. The patient's general condition is much improved; she is able to be up and about, eats with a good appetite, and in general feels very comfortable." She again reported herself at the infirmary in April, and the tumor seemed to be still further diminished in size.

Finally, I again visited the patient at her home on November 21st, exactly a year after her admission to the infirmary, and the following is my report: "The general health is excellent. The tumor is much less prominent, and hangs like a loose sac, as if almost all its contents had been evacuated. There is slight lividity at the margins, but no pain, except an occasional stinging, like neuralgia in damp weather. The tumor covers about the same area as at the time of dismissal, but consists of little more than loose skin. The scar of the operation wound is perfectly sound and firm. No pain is caused by free manipulation, and the clothes are worn without discomfort."

It is interesting to find that one of the most malignant forms of cancer—chorion carcinoma—should furnish us the greatest number of authentic examples of spontaneous recovery. This is particularly interesting because this type of carcinoma is most frequently subjected to microscopical examination. The frequent occurrence of spontaneous retrogression has introduced some confusion in the literature of chorion carcinoma. Cases which have been positively diagnosed as malignant have undergone retrogression, and we find that an active discussion is in progress as to what constitutes the evidence of malignancy in this tumor. In the light of the observations made on the mice, it would appear that there is no reason for assuming any essential difference between those tumors which retrograde and those which terminate fatally, aside from the resistance of the individual. Most of these cases have been subjected either to a simple curettage or an incomplete operation followed by recurrence.

The first illustration of retrogression of chorion carcinoma is found in Marchand's second article, which, with his first, constitutes the basis of our present classification of this form of tumor. In this case, the chorion epithelioma had penetrated through the uterine wall, and had so firmly infiltrated the pelvic tissues behind, that it could be but incompletely removed. Furthermore, a thrombosis of the uterine vein in the right lateral ligament which was severed during the operation was found to contain masses of proliferating epithelium, so that Marchand expressed the opinion that recurrence and metastases would shortly follow. At the end of one year, however, neither the abdominal organs nor the lungs contained metastases, and the patient presented all the evidence of complete health. Undoubtedly, according to Hörmann, in commenting on the case, the masses of tumor which were not re-

moved were deprived of their malignancy, so that they were no longer harmful to the patient.

Hörmann gives complete details of a case, in an article in Hegar's *Beiträge z. Geb. u. Gyn.*, bd. viii, h. 3, 1904, "Zur Frage der Bösartigkeit und über Spontanheilung von Chorioepitheliomen."

H. E., age 36, IV para, was admitted, 1901, into the University Gynecological Clinic, Munich.

Patient's periods have been irregular since the 15th of July, 1900. After a two months' pause, on the 15th of September she had an excessive hemorrhage from the uterus, and during eight days preceding the admission to the hospital, constant but not excessive hemorrhage. On the 18th of September, 1900, she had passed lumps of tissue and masses like portions of skin. She was treated for subinvolution of the uterus following abortion, with hot douches, etc. Hemorrhages ceased, six weeks afterward again returned, and on the 12th of November she had a very active hemorrhage. The uterus at that time was the size of an orange, its surface smooth. A curettage was performed at this time, and the microscopical diagnosis was as follows: Endometritis post-abortum, definite islands of decidua, and granular hypertrophy. After curettage the hemorrhage decreased for a considerable period, but ultimately returned in irregular form. Hemorrhage frequently contained dark brown fragments of tissue, sometimes masses of whitish substance. The uterus was again the size of an orange. At the time of her admission in March, 1901, she complained of constant hemorrhage, pain in the back, shortness of breath, and cough without expectoration.

The examination showed that on the anterior aspect of the vaginal wall, somewhat to the right, were two prominences the size of cherries, with necrotic surface and livid discolored margins. They presented the appearance of metastases. The uterus is larger than a man's fist, rests upon the anterior vaginal wall, and corresponds to a mass felt above the symphysis, which on palpation is found to have nodular outlines, and the whole is firmly fixed.

Because of this fixation, and the evidence that the uterus is involved, as well as the surrounding tissues, a radical operation is considered to be impossible, therefore the two vaginal nodules were removed with a cutting Paquelin and a curettage of the uterine mucosa performed. During this procedure the uterine cavity was found to be greatly enlarged, the surface raw, and during dilatation bloody brown masses of tissue, as well as proliferative tissue resembling mucosa, were extruded from the uterus, and greater masses removed with the curette.

The two metastases in the vaginal wall were immediately hardened for examination. Under the microscope both the vaginal metastases were found to consist of typical chorion giant cells and residual masses which penetrated deep into the muscular structure and produced atrophy and destruction of the muscular fibers. The diagnosis of chorion carcinoma of the uterine body with metastases in the vaginal wall was made, and because of the nature of the tumor an absolutely unfavorable prognosis was given. During the clinical observations which followed the operation, there were several times symptoms which pointed to the formation of pulmonary metastases, pain in the lungs, constant coughing without expectoration, cramps, dyspnœa, and marked cyanosis of the face. On the sixteenth day the patient requested to be permitted to return home, where she was later visited after some weeks by Hörmann. She was reported at one time to have had blood in her sputum, she became rapidly cachectic, and was confined to her bed. On the 29th day of April, 1901, she was taken into the Krankenhaus r. d. Isar. Here a metastasis the size of a cherry was removed from the introitus (entrance, dicht über der Harnröhre). Obviously, this was a recurrence of one of the earlier nodules. The uterus was very large, reached to a point half-way between the symphysis and the umbilicus. The patient constantly passed hemorrhagic mucopurulent secretion, had repeated chills, and a temperature of 41° C. On the fourth day of May, a new curettement and removal of the vaginal nodule.

Diagnosis of the tissues from the uterine cavity and from the vagina was made by Professor E. Albrecht as undoubted chorion carcinoma. From this time on Hörmann lost sight of his patient, but recent publications on the spontaneous cure of chorion epithelioma reawakened his interest, and he searched for the patient, and was not astonished to find that more than two years after the operation she was, at the time of his publication, in absolute health, with rosy cheeks, and with a strong young baby in her arms, which had been born a few weeks before, in a maternity institution in Munich

On carefully looking over the records of her case, he found that, following the second curettement, the only treatments she received were constant uterine irrigation, that the discharge from the uterus gradually decreased, appetite and general condition gradually improved, and at the end of eight weeks she was able to leave her bed. A run of temperature which had continued, reaching as high as 38° and 39°, gradually subsided, the uterus gradually decreased in size, the cervix gradually contracted. At the end of three months the patient was in fairly good health, the uterus was reduced to the size of a pear, was mobile retroflexed, and the parametrium and adnexa were free from disease. The hemorrhagic discharge had long since ceased, and no metastases were evident.

Beginning with August, 1901, to August 11, 1902, her periods returned regularly at the usual period, and lasted two days. At the end of this period she became gravid, and the course of pregnancy was normal in every way. On the 22d of May, 1903, she gave spontaneous birth to a mature fœtus, weight 3,750 grams. The placenta and membranes were absolutely without pathological change. The puerperium was without incident; the periods returned six weeks after the birth.

Examination held on July 21, 1903, by Hörmann, is as follows: Extremely good appearance, exceptionally good nutrition. Over the entire pulmonary region, pure vesicular breathing; hearts tones good. Abdomen, soft abdominal wall; absolutely no resistance over the symphysis. Vaginal examination shows the vaginal wall absolutely smooth; nowhere evidence of tumor or remains of such; no evidence of scars. Portio in the

spinal line, cervix a closed transverse cleft. Small amount of mucofluor cervicalis. Uterus undergone complete involution, slightly larger than a hen's egg, of good consistence, lying upon the anterior vaginal wall. In the anterior vaginal wall three or four small myomata the size of peas. The adnexa are free from inflammatory changes; the uterus absolutely movable.

Two cases of deciduoma malignum. Noble. *American Journal of Obstetrics*, vol. xlvi, No. 3, p. 289.

Noble reports, under the heading of case 2, an undoubted case of spontaneous retrogression of chorion carcinoma. Mrs. D., aged 24, two pregnancies. The first ended in miscarriage November, 1899, the second at the sixth week, August 15, 1900. During the past year menstruation has been irregular. Since the last miscarriage, August 15, 1900, constant hemorrhage from the uterus, profuse during the first two weeks, variable since. Entered Kensington Hospital for Women, November 14, 1900. Vagina and cervix normal. Large tumor resembling fibroid attached to the cervix and filling pelvis. Hysterectomy was performed November 17th. On opening the abdomen it was evident that the tumor was malignant and attached to the fundus. It filled the pelvis, was of dark bluish mottled appearance. It was adherent to the omentum, and appeared to have infiltrated the fundus of the bladder. Diagnosis of deciduoma malignum was made from the history and the appearance of the tumor. On attempting to separate the tumor mass from the bladder, the finger of the operator entered the soft structure of the tumor, and it was necessary to leave a mass of the neoplasm attached to the fundus of the bladder. Patient's feeble condition, and the extent of the operation which would have been necessary to remove completely the growth, including a large portion of the bladder-wall, seemed contraindicated, and a supravaginal hysterectomy was performed with the view that the case was hopeless from the standpoint of radical cure. Gauze drain was introduced. Convalescence was febrile until the sixth day, after which it was uninterrupted. February 12, 1901, three months after the operation, patient had regained the appearance of health, and expressed herself as feeling well, and on pelvic examination, vagina was found to be normal. A distinct mass might be palpated upon the bladder-wall where the portion of the tumor had been left after the operation. March 26, 1902, sixteen months after the operation, patient was again seen. She presented every evidence of good health, and expressed herself as quite well. Careful examination failed to show any evidence of malignant disease in any portion of the body. The mass which had been felt on the bladder at the preceding examination had disappeared. Vagina, bladder, and broad ligaments were entirely normal to touch.

The tumor removed at the operation was submitted to a careful microscopical examination. Sections taken from the periphery of the growth were described by the pathologist, Dr. Babcock, as follows: At the periphery, irregular masses of large cells are found infiltrating the muscular wall of the uterus, apparently lying in distended uterine sinuses. These cells contain one or several oval, rounded, or irregular, or more frequently fusiform, nuclei. In certain of the cells karyokinetic figures are present. The nuclei are various sizes. The surrounding protoplasm is finely granular, large in amount, and there is no distinct cell-wall, so that when massed together the demarkation between adjoining cells is not perceptible. Adjoining these cells, and frequently infiltrating between the muscular fibers, are much smaller cells, with small, regular, rounded nuclei encircled by a narrow band of protoplasm. These are not universally present, and are not nearly as conspicuous as the larger cells. The uninvaded portions of the uterine muscle show sinuses and blood-vessels distended by blood. Invasion by small lymphoid cells seems to precede that of the larger cells. As one recedes from the periphery, masses of the larger cells are found imbedded in the fibrine and amid collections of red corpuscles. There is only a moderate infiltration of polymorphonuclear leucocytes.

Section from the mucous membrane of the cervix uteri. The epithelial lining of the cervical mucosa is absent, and apparently had been removed by the curette. There is a slight hyperplasia of the uterine glands, and in some of these a tendency to a desquamative catarrhal process is indicated by the loosened cells and the granular *débris* found filling the cavity. About a few of the glands there is an infiltration of small cells of the lymphoid type.

The pathological diagnosis is syncytioma malignum of the corpus uteri.

The above description, combined with the two excellent illustrations given by Noble, leaves absolutely no doubt that his case was one of true chorion carcinoma.

Littauer. *Arch. f. Gyn.*, vol. lxxii, p. 294.

Littauer reports a case in which six weeks postabortum, an examination of the cavity of the uterus, from which there had been constant hemorrhage, discovered on the posterior wall of the uterus a circumscribed, soft nodule the size of a cherry, which penetrated through the uterine wall directly beneath the serosa.

Microscopical examination of this tissue, which was made by Risel, showed that it consisted of a proliferation of the epithelium of hydropsical chorionic villi. The cells which presented the characteristics of the giant cells of the serotina had penetrated between the muscle fibers, in many cases causing atrophy of the latter. In many of the smaller blood-vessels the masses of epithelium could be found penetrating the vessel-walls, which undoubtedly accounted for the excessive hemorrhage. A removal of the uterus was recommended, but as the condition of the patient improved rapidly, this was not performed. Several weeks later, a second curettage was made, with the result that the uterine mucosa was found to be perfectly normal, and one year after the first curettage the patient was perfectly well.

Fleischmann. *Monatsschrift f. Geb. u. Gyn.*, bd. xvii, h. 4.

Two and a quarter years after the removal of

a hydatidiform mole, there developed in the wall of the vagina a bluish-red nodule the size of a chestnut. The enlarged uterus was found to contain friable tissue, and as a radical operation was refused, the nodule was excised and the uterus curetted. During the curettement a perforation of the uterus on the right side was followed by the development of a hæmatoma in the right lig. latum.

The microscopical examination of the nodule from the vaginal wall, as well as the material obtained by curettage, gave undoubted evidence of chorion carcinoma. Predominating type was of the syncytial variety. (See illustrations.) The majority of the material removed by curettement consisted of malignant tissue forming large complexes of cells penetrating between the uterine muscular wall, the cells of which were in many cases widely separated by the proliferation, and several preparations showed marked atrophy, cloudy swelling, and necrotic areas. Microscopical appearances were such that both Marchand and Fleischmann made an absolutely unfavorable prognosis. Three months later the patient presented every evidence of health. Ten months after the operation, absolutely no pathological changes could be found in the genital tract. Menstruation had been established four months, was normal and regular. Fleischmann was of the opinion that the criticism that the curettement might have removed all of the tumor mass must, on the basis of the histological findings, be negatived.

The patient has since borne two children.

Von Franqué. *Zeit. f. Geb. u. Gyn.*, bd. xlix, h. 1.

Von Franqué publishes a case in which three months post-partum the patient's uterus was considerably enlarged. Curettement removed large quantities of friable tissue, which, on microscopical examination, he concluded to be typical chorion carcinoma. Following the curettement, the patient's health was restored. She has twice since given birth to normal children, and at the end of six years is perfectly well.

Langhans. *Beitr. z. Geb. u. Gyn.*, bd. v, h. 1, 1901.

Langhans reports a case in which, following a normal birth, a vaginal nodule the size of a walnut developed. This was removed with a sharp spoon, the base being cauterized. Fourteen days after, a recurrence developed at the site of the original nodule. This recurrent nodule broke open, cast out a green, necrotic mass of tissue, and healed spontaneously. Microscopical investigation showed, besides necrotic tissue, well-defined syncytial masses, between which are cells obviously derived from the layer of Langhans. Ten months later the patient appeared to be well.

Besides the fourteen cases here collected of cure, histological evidence of retrograde processes affecting the margins of tumors have been reported by Becher, Petersen, and Schwartz. Becher (Über Riesenzellenbildung in Cancroiden, *Virchow's Archiv*, 156, p. 62) described changes at the margin of squamous-celled epithelioma of the skin, which, to his mind, indicated a spontaneous retrogression of the epithelial pearls, and other adjoining epithelial cells, and he also found about the margins of these atrophying and hornifying cells, numerous giant cells, both of the myeloplax and the Langhans type. He believed that these giant cells were of the foreign-body type, and attributed to them both amœboid and phagocytic activity, believing that they were removing the atrophying epithelium, as in the case of other foreign bodies. He held that through the phagocytic activity of these giant cells a process was inaugurated which, in many cases, led to a form of partial spontaneous cure, resulting in the total disappearance of the epithelial pearls, and the organization of the same with young connective tissue. He believed that certain ætiological factors in the development of the tumors favored this process, especially the slow growth of squamous epithelioma and the chronic inflammatory irritation, associated with endarteritic changes in the blood-vessels, assisting in the isolation of the epithelial nests. Besides the foreign-body giant cells, Becher recognized a form of giant cell derived by coalescence of groups of isolated atrophying epithelial cells. He compared the changes found in these cells with those produced experimentally by L. Loeb, who transplanted fœtal epithelium into the subcutaneous tissue of adult animals of the same species. The cells of these transplanted fragments maintained themselves for a certain period in the tissue, and gave evidence of having divided for several generations. Upon the exhaustion of their proliferative power, Loeb found that the cells showed marked signs of atrophy, the borders of adjacent cells becoming obliterated. The nuclei underwent fragmentation, and the whole coalesced to form a pseudo giant cell, which in its ultimate form was scarcely distinguishable from a typical giant cell of connective-tissue origin.

At the termination of his article he stated that although the process of partial spontaneous cure in cancer inaugurated by or associated with giant-cell formation, in the ordinary clinical sense, was without much significance, it was, however, not improbable that, under certain favorable conditions, this process might

lead to a clinical cure. He viewed this process as an evidence of the natural resisting power of the body.

Following the suggestive observations of Becher, we are indebted to Petersen for further evidence on this subject. Petersen laid special stress upon the atrophy and coalescence of groups of cancer-cells as evidence of more complicated processes, which, under given conditions, could rob the cancer-cells of their vitality, and viewed these changes as direct evidence of special retrograde processes of the epithelium. He accentuated Becher's references to Loeb's experiments, and pointed out that besides the ordinary processes of fatty degeneration and necrosis which often involved the central portions of carcinomata, there was evidence at the margins of the epithelial cells that they were deprived of their vitality by some obscure process.

Schwartz describes an epithelioma papillare (*Virchow's Archiv*, bd. clxxv, h. 3, 1904) which developed in the scalp, apparently from and in the neighborhood of atheroma cysts. This tumor was of considerable extent. It was removed by operation, was a cauliflower-like growth, the base measuring 6 x 4 cm. The wound healed promptly, and the patient was discharged cured. The tumor was of papillary epitheliomatous character, and showed extensive areas of hornification, and in other portions partial calcification. Through the entire tumor there were areas of marked organization, which appeared to have developed in a short period of time, and to have led to a healing of considerable portions of the tumor. He describes at length the evidence of spontaneous retrogression of certain alveoli of this tumor, finding practically the same conditions as Becher. He describes accurately the type of giant cells as noted by Becher, and later by Petersen, but calls attention to the fact that many of the alveoli were in course of organization by connective tissue without the presence of giant cells. In this connection he refers to cases of Franke and Denecke, in which this phenomenon was marked. Franke described a case of epithelioma associated with atheroma cysts very much like that of Schwartz. Large portions of this tumor were invaded by young connective tissue, presenting the appearance of the organization of the epithelial nests by granulation tissue. Denecke, in a case of calcified epithelioma, likewise described the organization of portions of the tumor by connective tissue. The presence of giant cells were noted, and these appeared to be about the calcifying masses of atrophied endothelium. Borst also calls attention to a tumor which in places presented evidences of partial organization.

It will be seen from these publications that reparative processes in carcinoma were first recognized by Becher, a student of Orth, whose opinions were substantially indorsed by Petersen, and that further evidence of spontaneous curative processes has been added by Schwartz, a student of Orth. Both Becher and Petersen state that, in their opinion, these processes, when sufficiently energetic, lead to a complete clinical cure of established cancerous processes.

A comparison of the histological findings in the retrograding mouse tumors with those observed by Becher, Petersen, and Schwartz, in human tumors, shows that the changes found at the margin of all retrograding tumors are the same. We find the same pseudo giant cells resulting from coalescence of the atrophying epithelium, the foreign-body giant cells at the margins of necrotic material where this is present, and the growth of connective tissue; from all of which we may assume that the agencies which are responsible for the retrogression of the mouse tumors are the same as those which are occasionally active at the margins of human carcinoma. It has been found that a mouse, once recovered from carcinoma, cannot be successfully reinoculated within a certain period, and from this it is clear that the animal is, under these conditions, endowed with a resistance or an immunity against cancer which it did not previously possess. That the inhibiting effect exerted by these immune forces on the development of tumors is not always successfully maintained is shown in the case of those tumors (see diagram, Plate II), which, for a period, remain stationary or retrogress, and then ultimately overcome the resistance which is opposed to them, and succeed in destroying the life of the animal. It would appear that evidences of retrogression at the margin of growing tumors are the ex-

pression of insufficient activity of these immune forces. Whatever the nature of this immunity, it does not appear to be cytolytic in its action, the histological picture indicating rather that the epithelial cells at the margins of the tumor are in some way robbed of their power of destructive proliferation, after which they undergo simple atrophy and gradual absorption by the surrounding connective tissue. There appears to be some relation between the areas of hemorrhage at the margins of retrograding tumors and the atrophy of the cells, the evidences of retrogression being usually most marked at these sites. From the fact that the treatment of cancer materials previous to inoculation with the blood of recovered mice considerably reduces the percentage of successful inoculations, it may be supposed that the extravasation of blood into the tissues liberates an immune body capable of acting upon the epithelium.

In this connection it is interesting to note that mouse tumors retrograding under the influence of the X-ray present the same histological picture as those retrograding spontaneously, although the blood of such mice does not appear to exert an immune action upon cancer material. How the X-ray succeeds in bringing about retrogression of a tumor has been the subject of much discussion. Some authors have held that it interfered with the processes of karyokinesis. The detection of karyokinetic figures in the last remnants of retrograding alveoli is opposed to this interpretation of its action. On the other hand, Perthes' experiments with warts appear to give us a more definite clue to the modus operandi of the X-ray. Perthes treated warts with suitable dosage, and removed them at different stages of the treatment. He found that all the cells of the papilloma, with the exception of the deep layers, underwent hornification. When properly treated, the cells of the germinal layer resumed their normal function, and proliferated, not to form a new papilloma, but new skin. It would seem from this experiment that the X-ray is capable of restoring to the cells their normal function. Those cells which were superfluous underwent hornification, which was their natural fate. The X-ray is found to act in a similar way upon cancer; the cells, however, having no useful function to perform, are apparently removed by the same processes which dispose of misplaced epithelium. Perthes states that an explanation of the activity of the X-ray upon warts is that it removes the stimulus which causes the cells of the deeper layer of the skin to proliferate beyond their normal boundaries.

Ehrlich's observations on the development of sarcoma in the course of transplantation of carcinoma in mice appear to present further evidence of the existence of such a stimulus. Ehrlich's explanation of this phenomenon is, that, under given conditions, a stimulus present in the cancerous epithelium is transferred to the connective tissue of the stroma of the tumors, transforming them into sarcoma. There is no histological evidence of cytolytic action on the part of the immune forces in spontaneously recovered mice, and since the histological findings in tumors treated with the X-ray and those undergoing spontaneous recovery are identical, a plausible explanation is that both the X-ray and the immune forces in spontaneous retrogression act in opposition to some stimulus which causes the limitless proliferation of the cancer-cell.

CONCLUSIONS

1. Spontaneous cure of cancer in the experimentally inoculated mice occurs, in our experience, in about twenty-three per cent of the animals.

2. The chances of spontaneous cure are inversely proportional to the size of the tumor. The frequency of the occurrence and its distribution in animals suggests that it may be more frequent in human beings than is generally supposed.

3. The occurrence of spontaneous recoveries from cancer, indicating the existence of immune forces capable of terminating the disease, demonstrates that cancer is not necessarily incurable, and should serve as an additional stimulus to research directed toward the discovery of a serum-therapeutic treatment.

NORTHWESTERN UNIVERSITY MEDICAL SCHOOL
Department of Gynecology

TREATMENT OF CASES OF EXTENSIVE CYSTOCELE AND UTERINE PROLAPSE

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THESE photographs (Figs. I and II) were made from recent cases which were operated by me. They are typical of many cases of those displacements which are seen after the menopause. An ulcer is shown on the posterior lip of the cervix in both illustrations. These displacements may vary in extent, from being less than those shown in the above illustrations, to being so extensive that the entire uterus and anterior vaginal wall may be external to the vaginal orifice.

The following operation is described, as it is considered by me to be almost ideal for the relief of most cases of these displacements, especially after the menopause. The results in a rather large number of cases, some of them dating back to 1898, have usually been very satisfactory.[1]

TECHNIQUE

After the usual preparation, the patient is anæsthetized and placed in the lithotomy position. The uterus is dilated and curetted, if indicated. The anterior lip of the cervix is grasped with the vulsella; the anterior vaginal wall is separated from the cervix by a semilunar incision, and the anterior vaginal wall is incised in the median line from the cervix to within one half to one inch of the meatus urinaridrus, care being taken not to injure the bladder. (See Fig. III.) With the finger covered by gauze, the bladder is separated from the uterus by blunt dissection, as shown in Fig. IV. After the bladder has been completely separated from the uterus, the uterovesical fold of peritoneum will be observed as a thin, freely movable layer of tissue between the finger and the uterine body. The peritoneum is either perforated by the finger or is grasped with forceps and incised. The wound in the peritoneum is then stretched with two fingers sufficiently to allow the uterus to be delivered through the opening.

One should guard against perforating the bladder with the finger, by exerting most of the pressure upon the uterus, and not upon the bladder-wall. In cases where difficulty is encountered in separating the bladder from the uterus, the procedure can be much facilitated by making the separation to either side before it is made along the median line, as the attachment of the bladder to the uterus is firmer in the median line than at the sides. The anterior vaginal wall is now grasped on one side at the edge of the incision with an eight-inch forceps, and separated from the bladder-wall by means of gauze pressure. The same proeducre is carried out on the opposite side. The extent of separation of the anterior vaginal wall from the bladder will vary in different cases. It should extend over most of the cystocele that comes into view, and should make the flaps sufficiently large to cover the uterus after it is brought into the vagina. The uterus is now delivered into the vaginal canal; this may be done by passing the finger over the fundus or over the top of one of the broad ligaments, or the fundus may be grasped with a bullet-forceps. One should never attempt to grasp the anterior wall of the uterus and deliver it through the peritoneal opening, as the diameters of this segment are much greater than the diameters of the fundus. A suture is now passed through the vaginal flap near the urethra, through the body of the uterus, a little posterior to the fundus, and brought out through the opposite flap, at a corresponding point, as shown in Fig. V. The placing of this suture should vary in different cases. The fundus should be drawn sufficiently downwards to support the entire prolapsed bladder-wall, but care

[1] Am. Gyn. and Obs. Jour., Nov., 1899.

should be taken not to draw it down so firmly that it may press upon the urethra and interfere with urination. This suture is tied, and another suture is passed parallel to it, as shown in the illustration. Two or three such sutures are usually sufficient, as there is very little traction upon them. The remaining portion of the wound is now closed in much the same manner as a wound is closed in any part of the body. (Fig. VI.) It is immaterial whether one uses an interrupted or a continuous suture. Chromicized catgut, we believe, is the best suturing material. When the cystocele is very large, the redundant tissue of the vaginal flap should be excised.

The relation of the bladder to the uterus, when the operation is completed, is illustrated in Fig. VII.

Fig. 1.

The posterior vaginal wall is usually relaxed, and is generally the site of a rectocele, and a perineorrhaphy is invariably necessary to effect a cure. The perineorrhaphy not only restores the injured posterior vaginal wall, but also gives an additional support to the anterior vaginal wall. The perineorrhaphy should extend to the upper border of the levator ani muscle. This may be well accomplished by a modified Emmet or Hegar operation.

AFTER-TREATMENT

The after-treatment is about the same as is usually employed in most vaginal operations.

1. A sterile dressing is kept over the vulva.
2. Vaginal douches are not usually given, and never without definite indications.
3. An antiseptic douche is poured over the vulva after each urination, and care is taken that fæcal matter does not contaminate the wound.
4. Patients are not catheterized unless it is impossible to obtain a voluntary urination; they are allowed to sit up, or even to get out of bed, if necessary, to void the urine. Overdistention of the bladder should be avoided. Patients are allowed to sit up as soon as they desire, and may have a back-rest on the second or third day, and are usually able to be up and walk about by the end of the week.

THE PRINCIPLES OF THE OPERATION

1. The bladder is supported by and rests upon the posterior wall of the uterus.
2. The uterus is elevated in the pelvis by being tipped forward,— in fact, its position is changed about 180°. The twist produced in the broad ligaments by the change in the position of the uterus perceptibly shortens them. This twisting of the broad ligaments is the chief factor in correcting the uterine prolapse.
3. The tendency for the uterus and bladder to prolapse, following the operation, are antagonistic, as any sagging of the bladder increases the anterior displacement of the uterus, and any prolapse of the uterus elevates the bladder-wall.

RELATIVE ADVANTAGES OF THIS OPERATION

It is always preferable to plastic vaginal operations alone, except in cases where the

displacements are slight in amount. In extensive urine prolapse and cystocele, plastic vaginal operations give only imperfect temporary results, and the permanent results are nearly always disappointing, as the united surfaces are almost certain to gradually, stretch and displacements recur after the patients resume their usual duties.

I believe the operation is preferable to a hysterectomy, in all cases, except where the uterus is the site of malignant disease, or some other disease which indicates its removal. The operation is less mutilating than a hysterectomy, its technique is simpler, is less dangerous, and the uterus is used to decided advantage as a support for the prolapsed bladder.

I believe it to be decidedly preferable to the suspension operations done through an abnominal incision, because:

1. This operation is less dangerous than an abdominal section.

2. It is attended with less suffering, and convalescence is more rapid than after an abdominal section.

3. The displacement is more perfectly restored by this operation than by suspension operations.

4. Permanent results are much better in this operation, as from the nature of the wounds there is very little tendency for the united surfaces to stretch out, while in abdominal suspensions the adhesions at the line of union always elongate to a greater or less extent, and as a consequence recurrences frequently result.

Fig. 2.

RESULTS

This operation has been performed by me in nearly all cases of prolapse and cystocele that have come under my care at St. Luke's, Wesley, Mercy, and Provident hospitals, and in private practice since January, 1898. The number is not known. The results from an anatomical standpoint are, that the organs are not restored to their normal location and position, which is also a fact after any of the operations for these displacements.

We know of no case where the uterus or bladder have become prolapsed. In a small number of cases, slight suppuration has taken place in the perineal and anterior vaginal wounds, but not sufficient in amount to injure the result upon the uterus and bladder. In the earlier cases there was a fear that the operation might affect the bladder, but there have been no bladder complications of a serious nature. There have been no cystoscopical examinations made to determine if there were any changes in the mucosa of the bladder which have been reported by Kolischer (1) as of frequent occurrence after operations causing extensive traumatism of the bladder-wall. In no case has the retentive or expulsive power of the bladder been affected. There have been no cases of cystitis, or symptoms simulating cystitis, when the catheter has not been used. A few cases have suffered from a temporary "catheter cystitis."

An objection to the operation is that it cannot be employed in cases during the

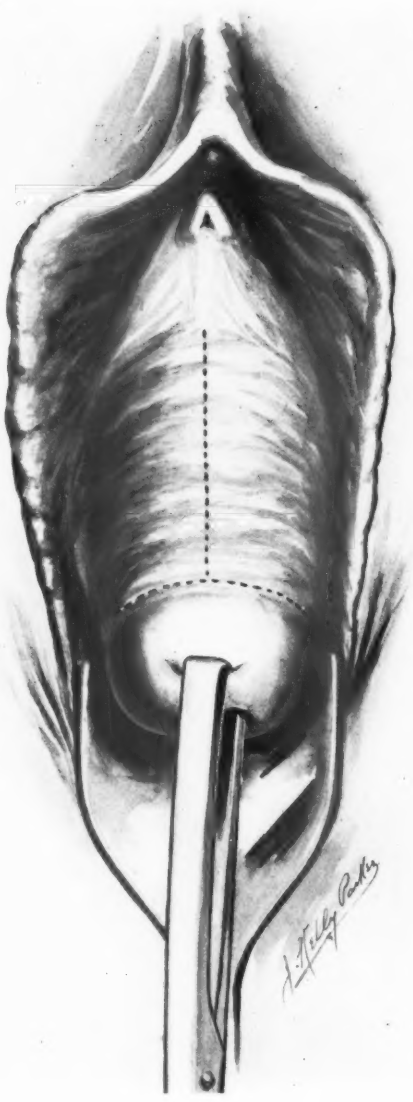

Fig. 3

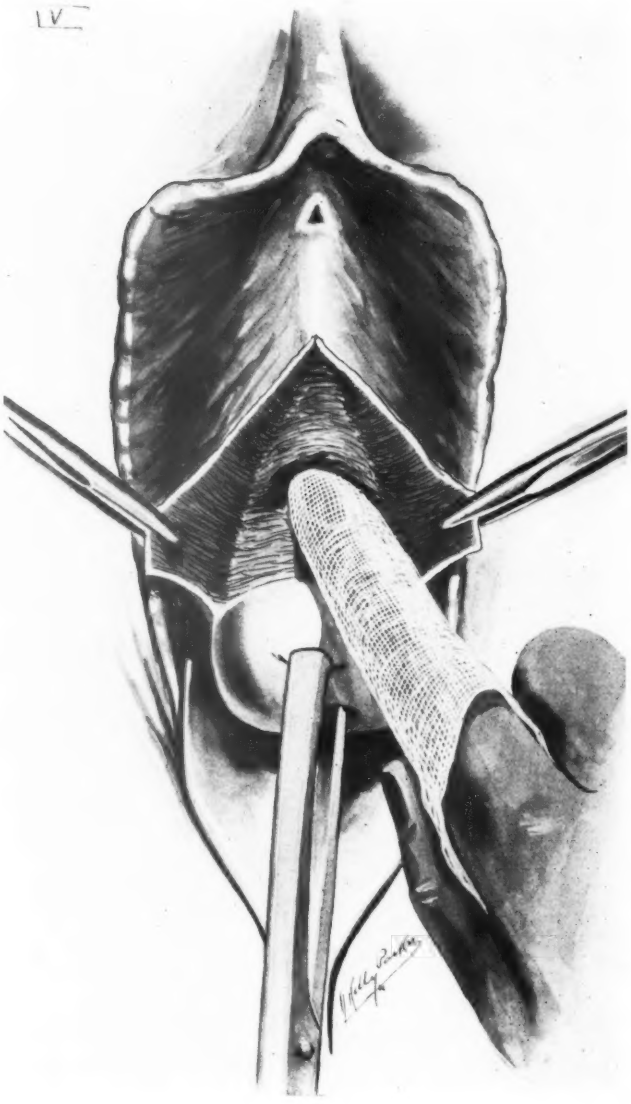

Fig 1

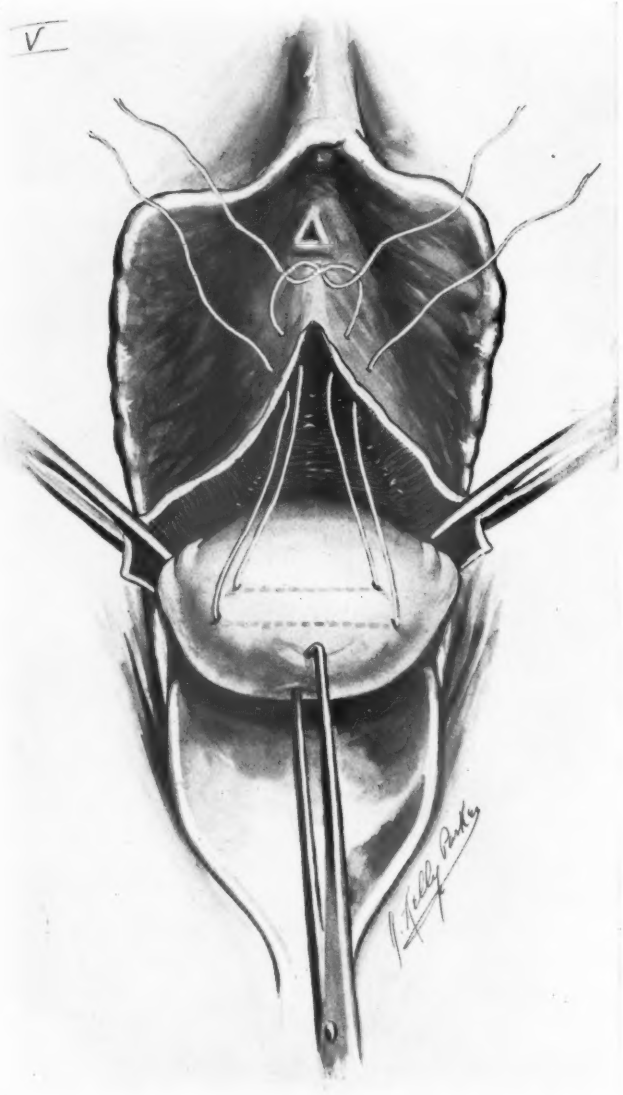

Fig. 5

Fig. 6

child-bearing period, without modifications, on account of the complications that would result from gestation and labor. This objection is not so important as might be presumed, as the majority of cases of extensive uterine prolapse and cystocele occur after the menopause. Another objection is that the technique is comparatively difficult, but it is no more so than that for other operations that are sufficiently radical to offer a hope for permanent relief of extensive displacements.

Fig. 7.

MODIFICATIONS OF THE OPERATION

1. *For cases where the uterus is so extensively prolapsed that the anterior fixation does not sufficiently relieve the displacement.*

2. *For cases operated upon during the child-bearing period.*

1. In cases of complete uterine prolapse, it is much better to modify the operation so that the uterus can be left, if not seriously diseased, than to do a hysterectomy, as even in these cases the uterus can be employed as an ideal support for the displaced bladder. This modification is made by severing a portion of the base of each broad ligament from the cervix and by suture of the free ends of the broad ligaments together in front of the cervix. The remainder of the operation is the same as described above.

2. In cases operated during the child-bearing period, one of two procedures may be employed.

a. In cases where it is especially dangerous or inadvisable for the patient to have more children, the isthmic portion of the Fallopian tubes should be excised and the uterine ends closed by suture so that a seroserous approximation will be made. Ries (2) has demonstrated that ligation of the tube is not sufficient, as the ligature will cut through and leave the tube patent.

b. If it is inadvisable to render the patient sterile, the operation may be modified by leaving the body of the uterus free in the abdominal cavity, and by suture of the anterior vaginal wall to the round ligaments and to the lower surface of the uterine body. In exceptional cases, the base of each broad ligament may be severed, and united in front of the cervix, as described above.

These operations, however, do not insure complete relief of the cystocele, as does the unmodified operation. It would seem that plastic operations alone for cystocele should not be used, except for comparatively slight displacements of the bladder, which are unatteded by much uterine prolapse.

This operation was first performed by me at St. Luke's Hospital, January 28, 1898. Three cases were reported before the Chicago Gynæcological Society, September 15, 1899, and were published in the *American Gynæcological and Obstetrical Journal*, November, 1899.

The operation described at that time differs slightly from the one described above, in that the vaginal wall was not separated from the bladder as near the urethra; more of the anterior vaginal wall was excised and the cervix was displaced farther backward by complete separation of the vaginal wall from the cervix and by a median longitudinal incision through the posterior vaginal fornix. The operation was developed from Dührrsen and Mackenrodt's operation for vaginal fixation for retroposition of the uterus.

Freund was the first to deliver the uterus into the vaginal canal for relief of uterine prolapse and cystocele; he delivered the uterus through an incision posterior to the cervix, sutured the anterior vaginal wall to the posterior wall of the uterus and the posterior vaginal wall to the anterior wall of the uterus after scarifying the walls, and made an opening through the fundus for uterine drainage. The uterus was left uncovered in the vaginal canal, except where united by suture. Freund (3) first did his operation in 1895.

Fritsch modified Freund's operation by delivery of the uterus through an incision in front of the cervix, and then closed the peritoneal cavity. An oval area was denuded on the anterior vaginal wall for the posterior surface of the uterus to be attached to, and the uterus sutured to the margins of this denuded area with catgut. A T-shaped incision was now made in the posterior vaginal wall, and the two flaps were dissected up and reflected over the body of the uterus and sutured with catgut (4). Wertheim (5) modified Freund's operation by delivery of the uterus through an incision anterior to the cervix; he then scarified an oval area on the anterior vaginal wall and a corresponding area on the posterior surface of the uterus, and sutured the edges of the two scarified areas. Bucura (6) reported on sixteen cases operated according to Wertheim's method.

Schauta and Wertheim (7) have recently reported an operation which is similar in many details to the operation which we have devised and described.

The operation which I devised and described has of late been called the Wertheim operation, although my report appeared before he described his modification of Freund's operation, and three years before his assistant, Bucura, reported upon the results of the Wertheim-Freund operation.

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NORTHWESTERN UNIVERSITY MEDICAL SCHOOL
Department of Surgery

VITELLINE DUCT MALFORMATIONS

With a Report of Cases of Diverticulitis in an Inguinal Hernia, Hernia into the Cord, and Intussusception

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ACUTE diverticulitis in a right-sided inguinal hernia; removal of diverticulum. Recovery.

Case 1. F. P., male, age about 20 years, student.

History of Previous Illness. There is nothing bearing on the present case; there is no evidence pointing in any way toward a hernia; no abdominal crises.

Present Illness. Began at about seven A. M., with pain in the right inguinal region. The history is meager, but when seen in the afternoon he presented the usual picture of a case of strangulated hernia. After a few minutes' attempt at reduction, he was sent to the hospital.

The patient reached the hospital within twelve hours after the onset of the attack. His condition was the same as when seen at his house, but his temperature was 102°. Unfortunately, his temperature had not been taken earlier, on account of the apparent clearness of his condition.

Findings at Operation. Upon exposure of the hernial contents, some turbid fluid was found in the sac. A single tubular structure, in all ways resembling bowel, except in the absence of a mesentery, protruded from the ring of the sac to its apex, where it was firmly adherent. Upon drawing up its proximal end, it was found to be derived from the free border of the small bowel. The diverticulum, before removal, was three inches in length and about one inch in diameter. Running along its side nearly to its end was a large-sized vessel, apparently a vein, which passed along the side of the bowel to the mesentery. The distal end of the diverticulum, adherent to the hernial sac at its apex, was gangrenous for a distance of about half an inch. There was no constricting band to cause constriction at the junction of the gangrenous with the healthy area. There was no constriction at the neck of the sac. The diverticulum proximal to the gangrenous area presented a practically normal appearance. There was some injection, not marked.

It is difficult to account for the gangrene of the distal end, unless it resulted from an acute diverticulitis. The adhesions were old. It seems most likely that the hernia had been down for some time, that there had been a previous diverticulitis, and that the present attack resulted in gangrene.

The rise of temperature should have been suggestive of an acute inflammatory process. Had attention been called to it before the operation, it would probably have been considered suggestive of an inflamed appendix in the hernia, rather than of a diverticulum.

The patient recovered

Intussusception caused by Meckel's diverticulum; reduction of intussusception and removal of diverticulum. Death.

Case 2. Willie M., age 34 months. Seen with my colleague, Professor Besley, to whom I am indebted for permission to report the case.

Patient had been a bottle-fed baby, and always obstinately constipated. His bowels never moved without a cathartic or an enema, and it was not unusual for an obstipation to exist for several days.

The first visit was made in the evening. He was suffering with some abdominal pain, and had vomited once or twice. Temperature 99.6°; pulse rapid. His bowels did not move with an enema, but some gas passed. There was no mucus or blood.

He was seen again the next morning. During the night he had slept, but was restless. During the day a little bloody mucus was passed. The abdomen was distended, and peristalsis was visible, but no tumor could be palpated. A diagnosis of intussusception was made. He was removed to the hospital and the abdomen opened.

Findings at Operation. On opening the abdomen, an intussusception was found. By manipulation reduction was successfully made. It was then found that the apex of the intussusception was an inverted diverticulum. The intussusception included about thirty inches of ileum, and was carried down through the ileocæcal opening into the colon.

The diverticulum was removed.

Patient did not recover.

Case of hernia into the cord; large congenital hernia into the cord; reposition. Death in three days; post-mortem.

Case 3. The patient is a male, the first-born of its parents. Labor was normal, apparently not impeded by the tumor mass. He presented a globular ventral hernia, the relative size of which can be made out by the accompanying photograph.

Description of Hernia The skin of the abdomen was reflected upon the base of the tumor for a distance

varying irregularly from half an inch to an inch and a half. It was continuous with the cord, which was spread out to form the greater part of the hernial sac. The portion of the sac made up of the cord was quite transparent. Through it could be seen almost the entire alimentary canal, including the stomach, the liver, and the spleen.

Aside from the hernia, there was no gross abnormality. No abnormal flexion of the spine was made out.

It was found possible to reduce the hernial contents and bring together the skin edges. The child was therefore sent to the hospital and operated within three hours of its birth. On delivery, the child was received into sterilized towels, and aside from its passage through the vaginal canal, came in contact with only sterile material until after its operation.

Operation. The hernia was reduced. The sac was removed a part at a time, beginning at the upper end, and sacrificing only an eighth to a fourth of an inch of the skin border. As it was removed the opening was sutured. Toward the lower portion of the sac the umbilical veins were cut across and immediately retracted. The sutures were quickly removed, the field was exposed, and the freely bleeding vessels picked up and ligated. The entire incision was now closed with through-and-through silkworm-gut sutures, the fascia and muscle being too poorly developed to permit of the use of the usual tier suture.

Further History. The child lived three days. No motion of the bowels was secured; vomiting was frequent.

Post-mortem. There was no infection along the line of satures. The peritoneum was normal, smooth, and shiny. There was no evidence of either peritonitis or obstruction. A culture made from the peritoneum gave a staphylococcus growth; but those who saw the post-mortem felt that the bacteriological findings were not satisfactory.

The alimentary canal was intact and normal. There was no malformation; no congenital absence of part of the canal, such as is mentioned as being not infrequent in large hernias of the cord. Death was probably due to inability of the small abdominal cavity to take care of the hernial contents.

With the closing in of the abdominal plates, the connection between the vitelline sac and the cavity of the primitive intestine becomes reduced to a tubular structure, the vitelline duct, continuous at one end with the convexity of the U-shaped primitive gut, at the other with the vitelline sac. The structure of the wall of the duct is, of course, identical with that of the wall of the primitive intestine. During the further evolutionary changes, the duct, during the second month, becomes reduced to a mere thread, with finally a complete solution of continuity between vitelline sac and gut. No traces of duct are present in the bowel-

1. Showing comparative size of hernia into cord, also flatness of abdomen.

wall of fœtuses of four to six months (1), or in the cord by the end of the sixth month (2). Cell groups found in the cord at term, and believed by Ahlfeld (3) to be vitelline remains, are considered allantoic remains by Minot (4).

Accompanying the duct are its vessels, the arteries arising in the primitive aorta and passing along the duct to the vesicle, the veins returning to empty into the mesenteric vein. Retrogressive changes in duct and vessels should normally be synchronous.

The primitive gut is first an intra-abdominal organ. Traction by the vitelline duct results in a hernia of the gut into the base of the cord, beginning at the end of the first month, reaching its maximum toward the end of the second month—fifty-third day (Minot)—when with the giving way of the duct, gradual reduction of the hernia, and complete closing in of the ventral plates, takes place. During the further development of the U-shaped primitive gut, the relative growth of the two legs is such that the insertion of the duct is in the lower portion of what becomes the ileum, with, however, so much variability in exceptional cases as to be placed at almost any part of the small intestine, from the lower end of the duodenum to its cæcal end.

Deviations from the normal in the evolution of the vitelline duct result in malformations that may be grouped in two quite different types of congenital malformation: 1. That represented by congenital diverticula and their remains, congenital bands, etc.; and 2. That represented by congenital hernia into the cord.

The explanation now generally accepted of

the relation of the vitelline duct to true congenital diverticula dates from the time of Meckel's writings early in the last century.

Diverticula had been described much earlier, and the congenital nature of some had been suggested.

Littre (5), in 1700, described a diverticulum which has by many been thought to be a true congenital diverticulum, which it certainly resembled in size, shape, and position on the ileum. Littre described it, however, as being without a muscular coat, which is characteristic of the acquired variety. It must be remembered that in true diverticula the muscular coat is often thinned and the folds of the mucous membrane smoothed out, a fact which Ahlfeld (6) makes use of in explaining his "traction" theory.

In 1701, Mery (7) described a right-sided hernia of a diverticulum.

Morgagni (8) was familiar with diverticula and their usual site. He discusses cases seen by him and by others; viz., Mery, Littre, Ruysch, etc. He had in mind the congenital nature of diverticula, but is not clear, as he ascribes their formation to "the thickening of fæces lower in the bowel, and their greater pressure." He recognized that the wall of the diverticulum was similar to that of the bowel. He includes in his discussion a case in which there were three diverticula, thus not differentiating the two forms. Morgagni is credited by Berard and Dolore (9) with being the first to suggest the congenital origin of diverticula, but Morgagni himself refers to the opinion of others, that they may be congenital.

Richter (10), in 1785, in describing "small hernias," by which he means hernias of part of the intestinal circumference, refers to the illustration of a diverticulum by Ruysch (12) and to the frequency with which "long, blind sacs attached to the bowel" are found in cadavers, and "occasionally, also, in surgical operations, in hernias." He gives it as his opinion that they result from long retained hernias of the bowel-wall in the hernial sac, with the pressure of gas and fæces from within gradually causing the wall to give way. He quotes Ludewig (13) as believing them to be developmental errors, because "they are built on the same plan, have the same covering, vessels muscle fibers, and glands as the bowel."

Sandifort (14) believed some to be developmental defects, others acquired. He found one in a still-born infant.

Meckel (15) definitely taught that the true diverticulum was a remnant of the vitelline duct which had not undergone the normal retrogressive changes to complete disappearance; that the wall of the duct became the wall of the diverticulum; and that the degree of deviation from the normal in the evolution of the duct determined the form taken by the diverticulum. Thus he was aware that the diverticulum may stretch from bowel to umbilical ring, attached at both ends, or merely form a blind sac attached to the bowel-wall. He described, also, the threads extending from the free end of the diverticulum, recognized their origin in the vitelline vessels, and stated that they may hang free in the peritoneal cavity, or be attached either to the umbilical ring or to some other part of the intestinal tube.

Ahlfeld (16) believed that traction of the vitelline duct on the bowel-wall resulted in a giving way of the latter to form the diverticulum. The thinness of the muscular layer and the absence of valvulæ conniventes, he considers evidence of traction.

Theoretically, the diverticulum should partake of the various pathological processes affecting the ileum. Obviously, there would ordinarily be no sign or symptom of its presence. There have been reported a small number of perforations of typhoid ulcers. Halstead (17) has recently added two cases to the number on record. There would be nothing clinically to differentiate such a perforation from perforation of the ileum.

Cases of acute inflammation of the diverticulum "diverticulitis" have been reported. They have usually been diagnosed as appendicitis, which they would resemble clinically. The presence of foreign bodies, fæcal concretions, etc., probably forms the same secondary ætiological factor as in appendicitis.

The communication with the intestine may be closed, the diverticulum forming a cyst, usually attached to the free border of the bowel. The cyst may, however, be intramesenteric, and should then be differentiated from cysts of

other origin. The structure of its wall would be diagnostic. The contents might be difficult to differentiate from those of dermoid cysts having origin in other structures (Wolffian and Müllerian bodies and ducts).

A preternatural anus at the umbilicus is associated with the more perfect diverticula whose attachment at the umbilicus has not been closed. Clinically, they would not be differentiated from the fæcal fistulæ at the umbilicus caused by the tying off of a loop of bowel in a hernia of the cord.

Secondary to the preternatural anus there may be:

1. A marked atrophy of the bowel below the level of the diverticulum, the greater part of the contents escaping at the navel.

2. A fungous mass at the navel, from prolapse of the mucous membrane and exposure to irritation.

3. A prolapse of the bowel through the umbilical fistula.

Fistulæ at the umbilicus are not necessarily fæcal. They may arise from vitelline remains left in the abdominal wall at or near the umbilicus, without any intestinal or intra-abdominal remains persisting. Such a sinus would have an epithelial lining.

The most constant source of pathological disturbance associated with a Meckel's diverticulum is intestinal obstruction. The recent literature of intestinal obstruction caused by Meckel's diverticulum begins with Fitz's paper in 1884, and is exhaustive. The mechanism of obstruction has been fully gone into by many recent papers, and will not be dwelt upon here.

Herniæ into the cord are generally attributed to an abnormally thick or resistant vitelline duct, which, by requiring more time for its disappearence, prevents the normal recession of the gut into the abdominal cavity. The size of the hernia would be influenced by the degree of resistance of the duct.

Herniæ of small size are not very rare. They are of sufficient importance to merit the examination of the base of the cord upon ligating, to prevent accident. Herniæ of large size are less frequent.

The closing in of the ventral plates is interfered with in proportion to the size of the hernia. The contents of the hernia may include nearly all of the abdominal viscera,—the alimentary canal from the stomach to the rectum; the liver, pancreas, and spleen. The kidneys are said to lie more deeply than normal, because of the flexion of the spine. As a result of the absence of its normal contents, the abdomen remains undeveloped.

2. Showing pear-shaped liver with small end attached forming a sort of pedicle.

Various malformations may accompany herniæ into the cord. Directly associated with hernia of large size would be the failure of union of mid with hind gut, due to the traction on the former. Atresia thus resulting is said to be frequent.

Photograph No. 2 shows well the deformity of the liver, pear-shaped, with its smaller end attached; traction evidently being the factor.

The types of diverticular disturbance represented by the two cases here reported are comparatively rare. In case No. 1 we have an almost unique combination of a diverticulitis occurring in a hernia. The analogous condition — appendicitis in a hernia — is also rare, but a number of cases have been reported. I have not found a report of a case similar to the above. Buntz (18) quotes a report by Dowse of a case of right inguinal fæcal fistula found at post-mortem to have origin in a hernia of Meckel's diverticulum. Whether it was caused by a diverticulitis occurring in the

hernia with gangrene, or from strangulation, one cannot say. Where a diverticulum has been found in an inguinal hernia, either alone or with other contents, it has usually given rise to symptoms because of strangulation.

Case 2 is also an example of a comparatively rare form of diverticular disturbance. In December, 1904, W. Watson Cheyne (19) in reporting a case, was able to collect but sixteen from the literature.

In one (case 5, reported by Brunner) it seems quite possible that the diverticulum was merely an invagination of the wall of the intestine, caused by an accessory pancreas, which was present in the apex of the invaginated diverticulum. When the diverticulum formed the apex of the intussusceptum, it was usually inverted, as in our case, either in whole or in part. In one case the mucous membrane only was inverted. I have found one case reported in which the diverticulum was in the intussusceptum, but not at its apex, apparently being merely carried down without acting as a casual factor.

Case 3 is typically representative of large congenital hernia into the cord. The mortality is necessarily high. When not operated at once, rupture of the cord membranes take place and infection follows. Inability of the abdomen to accommodate the replaced viscera was probably the cause of death in our case. Recently a case was reported in which a partial amputation of the liver was resorted to with success.

The literature of Meckel's diverticulum and of hernia into the cord is extensive.

Recently, A. Dreifuss has gathered the literature of Meckel's diverticulum in a paper in the *Zentralblatt für die Grenzgebiete der Medizin und Chirurgie* (1905). G. Lotheissen in *Wiener klin Rundschau* (No. 42), collect ninety cases of hernia into the umbiliced cord.

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NORTHWESTERN UNIVERSITY MEDICAL SCHOOL
Department of Obstetrics

THE PALPATION OF AN EAR AS A MEANS OF ACCURATE DIAGNOSIS IN VERTEX PRESENTATIONS

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THE ability to make a correct diagnosis in medicine or surgery, founded upon and substantiated by a physical, pathological, or anatomical basis, is the ideal ambition of the conscientious practitioner.

From the earliest period of history, when diagnosis was obtained by occult and mystic sources, down to the present time, and especially within the last fifty years, the history of medicine shows a determined and persistent effort to base diagnosis upon real facts and conditions. As this effort has in no small measure succeeded, so the treatment of the various diseases has been greatly improved, and the mortality rates show a steadily decreasing movement. Indeed, medical science has progressed so rapidly in late years that text-books become back numbers within a few years after their publication, and unless frequently revised, they fail to contain the latest facts with regard to diagnosis and treatment.

Only during the last twenty to thirty years has obstetrics come to the front as a medical specialty, and as a result we see that physicians, graduating from medical colleges, have been especially prepared to practise this art scientifically.

Obstetrical diagnosis has been a bugbear to many physicians, even those of long experience, mainly for the reason that they were not properly instructed during their college course, and a thorough physical examination had not become a part of their routine practice, and yet nothing is of greater importance to the physician in an obstetrical case that requires operative interference than to be assured of a correct diagnosis. If an incomplete or careless examination has been made and an incorrect diagnosis results, we can scarcely expect that a treatment based upon conditions that do not exist will terminate successfully, though it seems that Nature is frequently superior to the physician with his bad diagnosis and his worse treatment, and she is able to terminate the labor despite the obstacles.

A knowledge of the correct diagnosis immediately outlines the treatment, and the physician is enabled to carry out the proper treatment in the best possible manner.

In the text-books, we read of the various methods of making external examinations, and the assertion that it is possible to make a correct anatomical diagnosis without making an internal examination at all. That this is true in the great majority of cases, we all admit, yet it depends to a great extent upon certain conditions, the presence of which makes an accurate diagnosis more imperative. For example, a thick abdominal wall, hydramnion, or excessive sensitiveness of the abdomen may negative our best efforts in an external examination, and leave us to depend entirely upon the vaginal findings. If we are called upon to treat a parturient patient after many hours' labor, the retraction and rigidity of the uterine wall may become an impassable barrier. If the conditions are in our favor and the patient is seen early in labor, we should make only the external examination, and limit the number of internal examinations as far as possible.

The ease or difficulty with which a diagnosis of the position of the fœtal head in the pelvis may be made by the examining finger varies within wide limits. The fontanelles and sutures may be very large and wide, as in hydrocephalus, or very small and narrow, as in a well-moulded head, passing through a justo-minor or funnel-shaped pelvis. In flat pelvis, again, especially in the mechanisms known

as Naegale's and Litzmann's obliquities, or the presentations of the anterior and posterior parietal bones respectively, the parietal bones overlap each other, and render the sutures harder to palpate. If the head is well flexed, the large quadrilateral fontanelle is high in the pelvis and difficult to palpate, and the examiner has to depend upon the small posterior fontanelle and the saggital and lambdoid sutures. In monsters, as in anencephalus and exencephalus, the sutures and fontanelles are either absent or are so distorted as to be perfectly useless. In meningocele and hydrencephalocele, especially when the occiput is the seat of the deformity, trouble will frequently be experienced.

Spurious fontanelles and sutures, and the liability of mistaking the temporal for the posterior fontanelle, must also be taken into account. The height of the head in the pelvis will make a careful palpation more difficult. The careful accoucheur will be able to make a correct diagnosis of the position of the fœtal head in spite of these difficulties, but many whose obstetrical experience is limited may find considerable trouble.

The presence of a marked caput succedaneum, as occurs in protracted labors, will throw many off the right diagnosis. In these cases it may be difficult, if not impossible, to distinguish between the anterior and posterior fontanelles or between the various sutures, and therefore to be certain of the position of the head, and it is unfortunate that these late cases call for a great many of the forceps operations. Nor can we depend upon the findings of a previous examination, for it is a well-known fact that the head may rotate very quickly, whether the pains have been strong or not, provided it is not markedly impacted in the pelvis. It is therefore imperative to make a careful examination of the position of the presenting part immediately before the application of the forceps.

The palpation of the ear as a means of diagnostic value was first pointed out by Smellie, in his text-book on midwifery (1876, vol. i, p. 262), in the following words:

"The position of the head is distinguished by feeling for one of the ears, the fore or smooth part of which is toward the face of the child; if it cannot be ascertained by this mark, the hands and fingers must be pushed farther up to feel for the face or back part of the neck, but if the head cannot be traced, the observation must be taken from the fontanelle or that part of the cranium where the lambdoidal crosses the end of the saggital suture."

This method of ear palpation is one of greatest value to the obstetrician, and yet it is rarely if ever spoken of in the modern obstetrical works.

The conditions for the forceps operation being present, and some indication calling for the rapid termination of labor being present, the patient is prepared and anæsthetized.

Now comes the time to make the final examination. With the cervix effaced and the os dilated, and all pain and sensitiveness absent, the four fingers of one hand are passed up over the head to reach an ear. As the ear that lies anterior to the transverse diameter of the pelvis is nearer the examining hand, that ear is to be sought for. The location of the ear tells us at once in which diameter the saggital suture lies. If, for example, we find an ear under the symphysis pubis, we are certain that the head lies transversely in the pelvis. If the ear is felt laterally on either side in the transverse diameter, the saggital suture must lie in the anteroposterior diameter, and the occiput must lie either near the coccyx or under the os pubis. If the anterior ear is felt anywhere between the transverse diameter and the os pubis, the saggital suture lies in an oblique diameter, the size of whose angle with the transverse diameter varies with the distance of the ear from the os pubis. The location of the ear, therefore, tells us absolutely where the saggital suture lies.

The next important step is to ascertain at which extremity of the saggital suture lies the occiput. Further palpation of the ear shows that as the fingers are passed from the forehead to the occiput, they pass over the roughened surface of the ear, whereas, if the fingers are passed from the occiput to the forehead, the lobe is folded over the external meatus, and as the pressure of the fingers is released, a distinct flap may be noticed by the examiner as the ear lobe springs back into place. This sensation, which may be simulated by pass-

ing the fingers over the adult ear, is very different from that experienced as the fingers pass from the forehead to the occiput. This peculiar flap is best felt when the cartilage of the ear is firm and elastic. In dead and macerated fœtuses, the ear becomes more flabby.

If for any reason the examiner is unable to satisfy himself with regard to the flap, a second very accurate method of diagnosis is shown by the ear. As a finger is passed from the forehead to the occiput, it must of necessity pass over the opening of the external auditory meatus before it comes to the lobe itself. If, on the other hand, the finger passes from the occiput to the forehead, it passes along the smooth surface, over the mastoid process, until it reaches the lobe. In other words, we palpate anterior to the lobe a roughened and uneven surface, while posteriorly the surface is even and smooth, and as the finger is passed back and forth several times over the entire ear, we can decide definitely on which extremity of the saggital suture the occiput lies. Flexion or moderate extension of the head do not destroy the usefulness of this test. It is not possible to determine the presence or absence of flexion by means of the ear. This is to be determined by the palpation of that portion of the presenting part lying within the girdle of resistance.

The difficulty with which the ear can be palpated varies according to the conditions present. In the Naegale obliquity, the anterior ear may be felt just behind the pubis, or it may be felt near the axis of the birth canal. Likewise in Litzmann's obliquity, the posterior ear may be felt just below the promontory, or even more anterior. If the head is well moulded, so that it becomes dolicocephalic, the distance between the occiput and ear is increased and the palpation may be difficult. Again, in posterior occiput positions the ear is not so easily palpable as in occiput anteropositions. The farther anterior the occiput lies, the easier it is to feel the ear. In face labors, where the presenting part is disfigured, the palpation of the ear will give definite information by showing where the facial line lies.

It is not intended that this means of diagnosis shall supersede the old established method of vertex palpation, but that it be resorted to to corroborate and insure the correctness of the fœtal position.

While the palpation of the ear is not possible in many cases unless the cervix is dilated and the patient under deep anæsthesia, yet, when these conditions are present, there are few cases where this cannot be done. The danger attached to this test is practically nil, and in all cases it is far preferable to that method of applying the forceps to the head and make traction, trusting to nature to effect the proper mechanism of rotation. If it is possible to be sure of our diagnosis in obstetrics, any means of obtaining accuracy is certainly laudable, and it is firmly believed that if the physician will test this method carefully, as the author has in his own practice many times, he will rarely if ever be obliged to operate in the dark, but will be able in all cases to apply the forceps properly and scientifically to the fœtal head, causing a minimum amount of injury to the fœtus as well as the mother, and with a great amount of satisfaction to himself.

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ACUTE LOCALIZED INFLAMMATION OF THE LARGE INTESTINE

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EVERY one is familiar with the inflammatory disturbances occurring in and about the appendix and cæcum, but comparatively little is heard of circumscribed inflammations of other portions of the large intestine, as, for instance, the sigmoid flexure. A case which occurred in my practice about two years ago was illustrative of the latter.

An old lady of 78 years had been suffering with severe abdominal pain for some four or five days previous to the time that I first saw her. The onset was acute, with diffuse colicky and burning pains in the abdomen, which, at the end of about two days, had localized themselves in the lower left quadrant. The pains at times would assume an expulsive character, associated at times with tenesmus. She had vomited once about two days previous to the time I first saw her, but not since. She was troubled greatly with expulsion of gas from the stomach and bowel. The bowels had moved once by enema.

Previous History. Has been constipated for some years, and during the last six months had occasional attacks of diarrhœa, but no passage of blood or pus at any time.

Present Status. Small, anæmic woman. Head negative. Moderate arteriosclerosis. Lungs practically normal.

Abdomen. Somewhat distended; no peristaltic waves visible; no tenderness or rigidity, except in left lower quadrant, where a very tender, broad, elongated, smooth, resistant, sausage-shaped swelling was noticed, extending from about the level of the navel in the left midaxillary line downward and inward to the middle of Poupart's ligament. On percussion, flat tympany, no gurgling, no peritoneal friction noticed.

Liver. Edge palpable; otherwise negative.

Rectum and Vagina. Negative.

Careful examination revealed no palpable evidence of carcinoma at the time, nor has it since then. Because of the patient being at home, and not having very good or intelligent help, I could get the temperature only when I made my visits.

Temperature

1st day, 2 P. M. ..... 100½° F.
2d day, 6 P. M. ..... 100° F.
3d day, 4 P. M. ..... 99° F.

The tumor mass persisted for about a week, and then gradually began to get smaller, and simultaneously the pain and local tenderness diminished.

The bowel movements, which could be obtained only by enema, consisted chiefly of mucus, with but little fæces. No blood or pus at any time. There was practical recovery about ten days after the day I first saw her. Since then she has remained in good health.

Inflammatory conditions of the large bowel, similar to the one I just described, have been variously reported by different authors under the names: Pericolitis, by Windscheid (1); sigmoiditis, by Mayor (2); primary submucous circumscribed colitis, by Pal (3).

The symptoms consist of headache, malaise, often with nausea and anorexia, and are usually preceded and accompanied by constipation. Fever is usually present, though not always.

The diagnosis is based upon the finding of an elongated resistant tender mass in a part of the abdomen occupied by the large intestine; for instance, if the sigmoid is affected, in the left inguinal and lumbar regions, and the passage of much mucus.

Occasionally, a marked indican reaction can be obtained.

CLINICAL COURSE

The onset is subacute or acute, starting in with severe colicky pains in the lower part of the abdomen, usually in *a previously constipated person.*

The course may be acute or chronic. Occasionally, suppuration occurs, with subsequent rupture of the pus in the bowels, as in a case of Mayors (2). In one of Pal's cases, the pus-sac was opened externally, and in another the pus discharged through the left lung. In a case of Bittorf's, leucocytosis up to 24,000 occurred, but no pus was found in the stool at any time. No deaths or operations reported

to date that can give us any clew to the finer pathology.

PATHOGENESIS AND PATHOLOGY

The most prominent predisposing factor in all cases seems to be constipation. Any one who has seen the extensive ulcerations, often ring-shaped, involving the entire circumference of the wall of the intestine, which occur in all portions of the large bowel, due to pressure and infection from hard stagnating masses of fæces, can readily realize how easily infection can take place with formation of abscesses in the intestinal wall, mesentery, and retroperitoneum. The wonder is that infective processes do not occur more commonly from this cause.

Pal makes a differentiation between what he describes as "primary circumscribed submucous colitis," and "colitis stercoralis." In the former, a submucous infiltration occurs, which may result in suppuration or resolve, and, clinically, is accompanied by a tender, inflammatory, more or less clearly defined swelling, in a region occupied by some portion of the large intestine; while in the latter the process consists of ulceration, no submucous infiltration, and is characterized clinically by constipation followed by diarrhœa, with evidences of antointoxication. Of course these are simply views, and as there are no post-mortem reports, the pathology is not made any clearer. By comparison with what is known of the origin and spread of infective processes elsewhere in the body, one would think that an infection of the bowel-wall and surroundings could originate from any form of ulceration or injury affecting it, and that these localized inflammations of the intestine are not necessarily a class by themselves, but are simply infections of the bowel which may result from anything causing a lesion of the mucosa. Probably some of these cases of sigmoiditis arise from the infection of false diverticula, as was shown by Graser and Rotter to be sometimes the cause of strictures of the colon and rectum.

As regards the differential diagnosis from intestinal obstruction, there ought to be no difficulty, as the symptoms are not those of ileus. Tumors arising from a distended loop of bowel occur in volvulus, intussusception, and strangulation, but always, of course, associated with ileus.

The treatment consists of rest in bed, laxatives, enemata if necessary, and local applications of ice; if suppuration occurs, incision and drainage.

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NORTHWESTERN UNIVERSITY MEDICAL SCHOOL
Department of Pediatrics

CARCINOMA IN EARLY LIFE

With the Report of a Case of Carcinoma of the Rectum in a Girl of Sixteen Years

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THE rarity of carcinomatous growths in the first twenty years of life would seem to justify me in reporting the following case.

M. D., a German girl, aged 16 years, entered the Pediatric Department of Northwestern University Medical School on November 16, 1905. At that time the following history was obtained: The father and mother are living and well, and the parents of ten children. Of these, four were prematurely born (at seven months) and are dead, three died in infancy, and the remaining two, other than the case in hand, are living and well. The mother is subject to pulmonary troubles, having had pneumonia twice.

The patient is a seven months' child, born in a difficult labor. She has been weak and underdeveloped since birth, though she walked early. She did not talk until she was two and a half years old. She had never been sick up to five weeks before her admission to the dispensary, when her present trouble began, which has gradually increased in severity. Her chief complaint is pain in the lower portion of the abdomen, which seems to be somewhat more severe in the left iliac region. The stools contain bright red blood. She is very constipated. The amount of blood in the stools varies at times, there being only small streaks, while at other times there is profuse hemorrhage. Her last menstrual period before admission was very scanty, while the one previous to that was missed. Besides this, the child complains of anorexia and vomiting, also of some nasopharyngeal catarrh. She states that she has lost considerable weight.

Physical Examination. We have to do with a girl who, though she says that she is sixteen years old, does not seem to have the development of one more than thirteen or fourteen. She is thin and anæmic. Her muscular development seems much below par. Her face has a rather vacant stare, indicating a faulty mental growth, which, though not marked, is very evident. The cheeks are sunken, and she has a peculiar drawn expression. The examination of the nose and pharynx, made by Dr. Marquis, showed an atrophic rhinitis, with the septum deviated to the left, a granular pharyngitis, and adenoid growths. Examination of the thorax and its viscera showed nothing abnormal. In the left iliac region of the abdomen is felt a rather nodular mass, which might easily be taken for impacted fæces. The abdominal muscles are rather rigid.

Considering the general condition of the child, and the finding of the mass evidently in the sigmoid flexure, the diagnosis of chronic constipation with fæcal impaction was made, and the patient put upon cathartics and laxatives, and an iron tonic. Examination of the stools showed blood and pus, but no tissue fragments. Blood count showed red-blood corpuscles, 4,410,000; whites, 5,600. No rectal examination was made at this time. The general symptoms of pain and constipation were relieved, and the child came back only occasionally to the dispensary.

December 23, 1905. Stools scanty and frequent, and still contain mucus and blood. Enema of one quart of normal salt solution every day ordered.

January 5, 1906. Patient feels somewhat better.

January 13, 1906. Patient still complains of abdominal pains and bloody stools. She looks anæmic and emaciated, and seems to be losing weight. It was decided to make a rectal examination to see if there could be determined any definite reason for the continuous appearance of blood in the stools. The examining finger, on passing about two inches inside the sphincter, encountered a hard, irregular mass, evidently involving the wall of the rectum. This was rather nodular, and it required some effort to pass the finger beyond the mass, which was mostly in the posterior wall. On removing the finger, there was quite a profuse hemorrhage. At this time, although both conditions are rare, the diagnosis seemed to lie between carcinoma and multiple gummata of the rectal wall. The patient was put upon potassium iodide.

January 30, 1906. The potassium iodide was not well borne, and was discontinued. A second rectal examination was made, and it was found possible to break off a small piece of the tumor mass, which was done. Microscopical examination of this by Dr. Goldsmith revealed the typical structure of an adenocarcinoma. (See plates.)

March 27, 1906. Rectal examination showed that the carcinoma had grown so that it could be felt an inch above the rectal sphincter, and occluded the lumen so much that the tip of the finger could not be introduced into it. The general symptoms, however, were much improved. The abdominal mass had disappeared, and there were no signs of metastases in the liver or other organs. The patient was more anæmic and emaciated, but the constipation had been

relieved under the continuous use of cascara sagrada. Blood still continues abundant in the stools.

Speaking of rectal carcinoma, von Bergmann (1) says: "In seventy per cent of the cases, the age of the patient lies between forty and seventy years. It is a remarkable fact that rectal cancer occurs also in children, even in those less than ten years of age, which may perhaps be explained by the frequency of adenoid growths in children. Gelatinous cancer is almost exclusively found in young persons; only one in twenty-one affected was more than thirty years old. (Finke.) From two to three per cent of all cases of rectal carcinoma occur in persons between twenty and thirty years of age."

After thorough, though probably not exhaustive, survey of the literature, I have been unable to find any case of carcinoma of the rectum occurring in a child under ten years of age.

The case of Desprès (2), so long reported in English text-books as occurring in a child of six years, I find, on referring to the original, occurred in a boy of sixteen years. Death followed in this case. There was no microscopical examination. The only case of adenocarcinoma of the rectum that I have been able to find occurring in an individual under twenty years of age, other than the one reported, is that of Czerny (3). This was in a boy thirteen years old, and occurred in the posterior part of the rectum. A portion of the growth was obtained in the same manner as in my case, and microscopically showed an adenocarcinoma. Czerny also mentions having reported a case in a patient eighteen years of age, but does not state the variety of the cancer.

In 1846, Busk (4) reported a "medullary sarcoma" of the rectum in a boy sixteen years old. By later writers this has been accepted as a carcinoma. Cummings (5), in 1854, reported a gelatinous cancer in a boy of twelve years, and Pillon (6), in 1856, a hard cancer in a girl sixteen and a half years old. Ashton (7) mentions, in addition to the case of Busk, one of Pushe, an encephaloid growth in a boy of twelve years. In 1880, Hayd (8) reported a hard nodular carcinoma of the rectum in a boy of eighteen years. Kelsey (9) reports the cases of Allingham, encephaloid cancer in a boy of twelve years; Gowland, in a boy of thirteen years; Mayo, in an individual of twelve years; and Godin, at fifteen years. In recent literature I have found no cases of cancer of the rectum occurring in individuals under twenty years of age.

The case here reported is, then, a rare one, not only in the disease itself, but also in the type of growth which it represents. Carcinomata are being more often reported of late in children, and it is therefore interesting to note such a case.

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NORTHWESTERN UNIVERSITY MEDICAL SCHOOL
Department of Surgery

THE SIGNIFICANCE OF SKULL DEFECTS

With the Report of Several Cases

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IT is the desire of the writer to record his experience with cases of skull defects following injury or the mechanical removal of portions of the same. The subject, though an old one, has many interesting phases, especially the varying results of apparently similar injuries. In this publication there will be considered only typical cases of the different varieties.

Case 1. A. E., female, aged 13, American. The patient was injured ten years ago, at the age of three. She fell a distance of thirty feet to the ground, and, as far as is known, did not strike any obstruction during the fall. The mother picked her up and found her unconscious. There were no contusions or abrasions to be seen. After eight hours a swelling was noticed in the region of the forehead, which gradually grew to an enormous size. She remained unconscious for about sixteen days, but moved her extremities from time to time, showing that there was no motor paralysis. The swelling became somewhat soft and slightly discolored, but did not completely disappear for several months. Her eyes did not suffer from the injury, for she moved them freely from time to time and could see plainly.

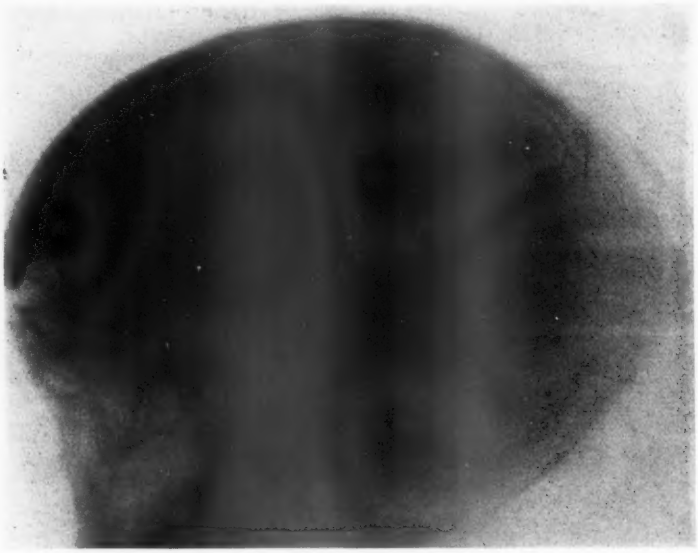

Fig. 1. Case I. Radiograph taken in 1902 Greatest width of defect, 1 cm.

About two years after the injury, a physician discovered a defect extending across the forehead, under the still remaining slight swelling.

When the patient first came under my observation, which was six years after the injury, she presented the following condition: There was a fissure, about 1 cm. wide, extending across both frontal bones, with a narrowing in the middle. (See Fig. 1.) The bony mar-

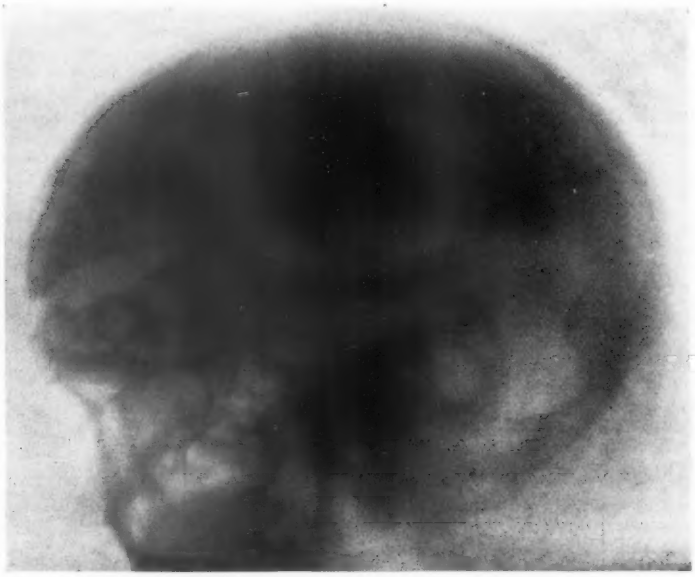

Fig. 2. Case I. Taken 1906 i. e., ten years after the injury. Greatest width of defect 1⅛ cm.

gin was rounded and smooth. There were no scars to be found in the skin. Upon coughing or stooping, a bulging occurred, which pulsated freely. There was no dizziness or headache, nor had there ever been. There were no other findings.

The patient came under my observation a second time (May 5, 1906), that is, ten years after the injury, and the examination shows that the defect has grown wider, for it is now 1⅛ cm. wide, about the same length (7½ cm.), and is located 2 cm. above the orbital ridge. (See Fig. 2.) The bulging has definitely increased, but the child suffers absolutely no inconvenience (See Figs. 2 and 3.)

In this patient we have a subcutaneous fracture of the frontal bones, with a tear in the dura. The dura during childhood is firmly adherent to the skull, as is well known, and consequently tears with a fracture. This leads to an extravasation of cerebrospinal fluid mixed with some blood, and hence gives us a tumor of slow growth, not limited by the sutures, as is the case in a cephalhæmatoma, but comes under the epicranium. The probable reason for a failure of union of the bones in such cases is the constant action of the intracranial pressure through the fluid, producing absorption. I also believe that as the skull grows, and the edges do not, there is a tendency for them to separate further.

Case 2. I am indebted to Dr. Hepburn for this case, having seen it in consultation with him.

J. J. D., male, aged 20. The history of this patient, excepting that concerning the injury, is of no consequence.

On October 10, 1902, at 9 A. M., he fell a distance of about twenty-seven feet down an elevator-shaft, striking his head upon a stone. He arrived at the hospital at 10 A. M. of the same day. Upon examination, he was conscious, could talk, hear and see, but could not walk, because of loss of blood. There was no paresis, no paralysis of the extremities.

Over the right eyebrow, extending backward and upward to one inch above the right ear, there was a very large contused, lacerated wound, with pieces of bone and a large mass of brain protruding. The wound was seven inches in length. A portion of the right frontal bone was depressed, and a long fissure extended backward into the parietal bone. The wound was filled with dirt. Pulse 90; temperature 98.8°; no focal symptoms.

The wound was cleansed carefully. The contused edges of the skin and about three tablespoonsful of brain and four pieces of bone (the largest 1½ by ¾ of an inch) were removed. The lacerated dura was excised. A slight hemorrhage occurred, which was controlled by iodoform packing, over which the skin was sutured.

Fig. 3. Case I.

The following day the temperature was 101°, pulse 110, gradually subsiding to normal before the expiration of a week, at which time the packing was removed. The wound discharged some serosanguineous fluid, but otherwise ran a perfectly normal course.

There was no compression pulse at any time.

When the patient left the hospital at the end of four weeks, the wound was entirely healed. The right upper eyelid drooped, and the movements of the eye itself were limited. The skull defect, which was about 1½ by 2½ inches, pulsated freely. When the patient stooped, he complained of dizziness and headache, and a distinct protrusion was visible.

At a recent examination (May 4, 1906), about five and one-half years after the injury, the findings were as follows: Weight, 153 pounds; height, 5 feet 3½ inches; age, 26. Nutrition good. Motor and psychical disturbances absolutely lacking. A large depressed scar was visible, extending from the frontonasal angle upwards, and backwards to one inch above the ear. In the middle of this scar a defect of the bone about the size of a quarter could be felt, apparently round and having smooth edges. (See Fig. 4.) In the skiagraph this defect is very much larger, and almost oval. (See Fig. 5.)

At this point there is still a slight hernia, which becomes more pronounced when the patient stoops or coughs.

The eye findings here given by Dr. Crocker are as follows:

April 28, 1906. Examination of J. J. Daley's eyes. Vision left eye, 20–20; vision right eye, 20-20.

Fundus, left eye, normal.

Fundus, right eye, normal, except a few deposits of pigment and atrophic areas in lower quadrant, the result probably of the traumatic chorioretinitis. Right eyeball has been displaced downward one quarter of an inch. There is a paraylsis of the right external rectus of sufficient degree to limit the movement of eyeball to ten degrees outward. All other movements of affected eye are normal, and binocular vision is maintained, except when gaze is directed to the right.

In this patient we have an example of a compound complicated skull fracture, with loss of brain substance, and a portion of the skull, without any serious results. Because of the loss of dura we have a hernia.

Case 3. Patient, female, aged 8. Struck by a street-car, September 17, 1901, and suffered from a compound comminuted fracture of the posterior portion of the left parietal bone. She was taken to Mercy Hospital and placed under Dr. William E. Morgan's care, to whom I am indebted for the following history.

There was profuse hemorrhage, and a portion of the brain substance protruded. The wound was treated with the usual aseptic and antiseptic precautions. About a teaspoonful of brain substance was removed, and some pieces of bone — one large and several small ones — which were kept in normal salt solution. The dura was cut off, leaving a skull defect about the size of a fifty-cent piece. An iodoform gauze tampon was used to check the hemorrhage, and the

Fig 4. Case II. Defect as it feels.

scalp was sutured loosely over this. Four days later, the sutures and packing were removed and the bony fragments above referred to replaced, and the wound sutured a second time.

On November 5th the patient left the hospital entirely cured. There was no pulsation to be seen or felt.

The patient came under my observation about April 28, 1906, when the findings were as follows:

Age 12. Body well nourished. No psychical or focal disturbances. Over the left parietal bone a soft, pulsating scar, about as large as a half-dollar, is visible. infected, and it was necessary to open it and remove the packing. After about six weeks' time the wound was completely healed.

Nine months later the patient began to complain of neuralgic pains in the scar. These increased in intensity until the patient became emaciated, losing thirty pounds because of inability to sleep. When he came to me for this pain, I found a skull defect about 1 by 1½ inches, irregular in shape, without any pulsations to be seen or felt. The slightest pressure upon the scar would produce a paroxysm of pain. There were no other disturbances.

Fig. 5. Case II. Defect as shown in radiagraph.

(See Fig. 6.) The edges of the bone are smooth and not very sensitive.

The skiagraph (see Fig. 7) shows that the replaced bone has been completely absorbed. In this case we have a hernia because of a loss of a portion of the skull and dura, and a complete absorption of the replaced fragments, although it was done under the most favorable conditions.

CASE 4. C. A., aged 45, male, laborer. In July, 1902, struck by a stone over the posterior portion of the right frontal bone, sustaining a compound comminuted skull fracture. Several fragments of bone were removed. The dura was intact, and pulsated freely. The wound was sutured and drained with iodoform gauze. After several days the wound became

The diagnosis was that there were probable adhesions between the brain, arachnoid, pia, and dura following the infection.

The patient entered the hospital, when a horseshoe-shaped flap, having its base downward, was made, so as to have the scar in the center of the flap. The scalp was dissected from the dura with some difficulty; the dura was opened, and not even the slightest adhesions found inside of it. The scar tissue in the bony defect was very thick, and a considerable portion of it was extirpated. The dura was sutured and a piece of gutta-percha tissue placed between it and the scalp. The skin was sutured and the wound healed ideally,

Fig. 6. Case III.

since which time the patient has been free from pain.

In this case we have a primarily infected wound, with the removal of a portion of the skull, followed by prolonged suppuration and the formation of a great amount of connective tissue, which prevented a hernia, but was probably the cause of the neuralgia by compressing a nerve filament. It seems to me that the good result obtained was not due so much to the use of the gutta-percha tissue as to the removal of the connective tissue.

CASE 5. S. A., aged 19, female. Fell from the second story, November,. 1903, striking a jardinière, suffering a compound depressed skull fracture, 1 by 1½ inches, located on the posterior portion of the right parietal bone. A careful examination failed to disclose any other symptom than a depressed skull fracture, which produced no effect upon the patient. The borders of the skin were removed, a small trephine and de Vilbiss forceps employed to cut out the depression. This left a skull defect 1½ inches by 1 inch, and revealed a dura perfectly intact and pulsating normally. The skin was closed without drainage, and the wound healed by primary intention. The patient left the hospital at the end of two weeks.

The pulsation could still be felt. She came under my observation again, March, 1906. An examination showed a slight depression, with a very firm base, but no pulsation or bulging, nor any other symptoms present. The patient represents the type of depressed skull fracture healing under favorable conditions.

Fig. 7. Case III. Defect.

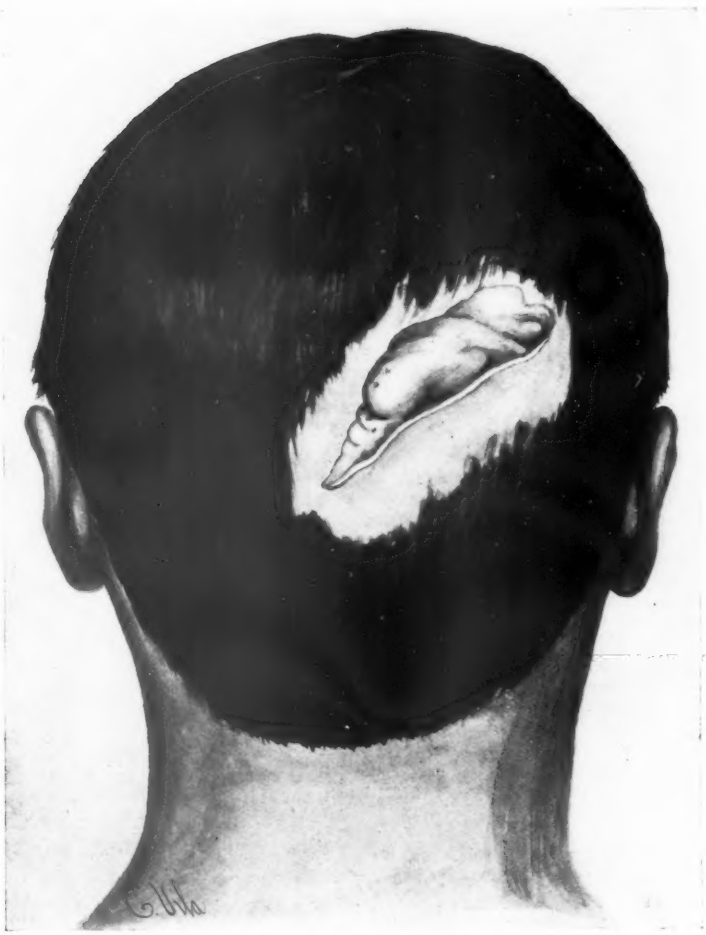

Fig. 8. Case VI. Protrusion of brain which was not lacerated.

Fig. 9. Case VII. Defect with intact dura. No bulging.

CASE 6. B. S., aged 15, male. November 10, 1904, he fell about fifteen feet, striking a sharp rock. The examination showed a contused, lacerated scalp wound, through which brain substance protruded. (See Fig. 8.) The injury was located in the posterior portion of the right parietal bone, and extended downward and to the left into the occipital bone. The skull wound was 2½ by 1 inch. His pulse was 115. Temperature normal. No focal or other symptoms present.

Three fragments of bone were removed, but no brain substance. The wound was carefully packed with plain gauze, and the brain gently pressed back into normal position. On the third day the patient's temperature rose to 102°. He became delirious, and remained so for a week. The wound suppurated, and death from meningitis seemed imminent, but at the end of six weeks, granulations had formed throughout the entire wound, and the second operation was undertaken to cover the granulating surface by bringing the edges of the scalp together, which was successful. The boy left the hospital after ten weeks, free from any symptoms, and has remained so up to the present time, one year and a half after the injury.

At present the wound pulsates, and there is a protrusion over the skull defect about half an inch above the level of the scalp.

CASE 7. J. O., aged 76, male. Patient had been suffering for the last two years from an epithelioma of the scalp, including an area about 3 by 4 inches. The epithelioma had invaded the outer table of the skull only. In October, 1904, a portion of the vertex of the skull, 4 by 5½ inches, was removed by chisel and mallet. The dura appeared normal. A slight hemorrhage started from the longitudinal sinus, but was controlled by packing. The wound was dressed with plain gauze and vaseline. Pulsation was visible. Four days later the wound was dressed for the first time and packing removed. After six weeks' time the granulations had formed nicely, and Thiersch grafts were applied, which healed completely in thirteen days. There was no bulging of the brain, but, on the contrary, the top of the head became flat. Pulsation was present. He did not suffer any disturbances whatever.

Two months ago the patient was entirely well. He merely wears a padded cap, because of slight sensitiveness. Pulsation was still present, but no bulging.

CONCLUSIONS

In making deductions from these few cases it would seem:

1. That no protrusion is found when the dura remains intact, but it is quite the rule when the dura is torn.

2. In skull defects, where the dura remains intact, connective tissue fills the gap so firmly that it seems to the sense of touch as though it is bone, but the X-ray picture disproves this.

3. The result of replacing bone fragments is very uncertain, as such fragments frequently become absorbed.

4. Cases requiring mechanical devices, or König-Miller osteoplastic flaps, are infrequent, and should present more severe symptoms than mere absence of skull structure.

5. I have been unable to find cases recorded of injury to the brain resulting from skull defects.

DEPARTMENT OF TECHNIQUE

NORTHWESTERN UNIVERSITY MEDICAL SCHOOL

Department of Obstetrics

THE TECHNIQUE OF FORCEPS

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Since a recognition of the possible dangers has become more general, the use of the forceps has been established as an operation of great dignity in modern obstetrics, and the principles that should govern the employment of the instrument have been exhaustively studied.

In spite of a sporadic tendency toward the use of the axis-traction instrument for all cases in which forceps are indicated, it is a fact that some form of the shorter instrument is most commonly used throughout America and Europe. There have been almost innumerable modifications of the forceps, but the most popular, and the one most in accord with the scientific principles which should govern its employment, is the so-called Simpson forceps, which was termed by Jaggard "the most perfect surgical instrument ever devised."

Whatever the indication may be which impels the obstetrician to apply forceps, there are certain conditions which *must* be fulfilled and certain preparations which should be carefully made, in justice to the patient and the operator, before the operation is attempted.

The conditions of most importance may be briefly referred to.

1. *The head must be engaged* (i. e., the largest diameter of the head has passed the bony inlet). If this condition is not fulfilled, *version*, and not forceps, should be the operation of election.

2. *No serious disproportion should exist between the head and the pelvis.*

It is difficult to fix the boundaries for this condition, but, in general, it may be stated that a pelvis with a conjugate vera of less than 8.5 cm. will not permit the unmutilated head of an average mature child to pass.

If forceps are applied in such cases, the result may be similar to cranioclasis in many instances.

In the case of hydrocephalus, the forceps slip and are ineffective, while the instrument is contraindicated in premature and microcephalic cases, unless an especially small pair is at hand.

3. *The cervix should be effaced and the os dilated (or easily dilatable).*

Otherwise lacerations of a deep and dangerous character may occur, extending into the vaginal vault, or even into the peritoneal cavity, with sequential serious hemorrhage at the time, or a subsequent severe infection, or both.

Furthermore, the cervix may be grasped and crushed (or torn) by the blades of the instrument, or such a degree of traction may be exercised upon the bladder that dysuria or incontinence results.

4. *The bag of waters must be ruptured and the membranes retracted.*

The violation of this condition may result in a dislocation of the placenta, and produce a severe hemorrhage, or asphyxiation of the child.

5. *The child should be living*, otherwise perforation and cranioclasis becomes the operation *election*.

The forcible delivery of a mature child by means of forceps is so serious an operation that it should not be attempted, out of regard for the maternal tissues in the case of a dead child, but, naturally, this condition is only relative, and the sentiment or the religion of the parents often demands the operation, but the risks and the dangers should be carefully explained. In any case where doubt exists as to the viability of the child, *of course* use forceps.

6. *The forceps should not be applied to the breech of the living child*, on account of the danger to the tissues of both child and mother.

Serious lacerations over the sacral bones of the child and fatal compression of the blood-vessels have resulted from such an unwarranted application to the breech. For this purpose the blades are poorly adapted, and they readily slip and cause serious injury to the maternal soft parts. An expert operator *may* possibly use forceps in

this manner without injury, but he rarely does so, because he has learned what a greatly superior instrument for this purpose he possesses in his fingers.

It is essential, also, to note the size of the caput succedaneam, the condition of the mother, and the fœtal heart tones.

An operation undertaken in behalf of mother and child should not be delayed until either is unable to benefit by it.

A large caput means that the child has been fixed for a long time, and that the natural powers are unable to effect the delivery.

Some of the above conditions are frequently and grossly violated, as, for instance, the application of the forceps while the effacement of cervix and the dilatation of the os are incomplete, or before engagement has taken place, or without an accurate knowledge of the presentation and position.

The necessary preparations involve the patient, the operator, and the enviroment.

The Patient. The bladder and rectum must be emptied. The pubic hair should be shaved, if possible — clipped close, at any rate.

The abdomen, which has been radically cleansed in preparation for the labor, is again scrubbed with a nail-brush, green soap, and hot water, from breasts to pubis, as well as vulva, perineum, and thighs. The excess of soap is washed off and the parts scrubbed again with one-per-cent lysol solution, followed by 1-4000 bichloride solution and with sterile water, followed by lysol solution. A gauze pad wet in the latter is then placed over the vulva. Disinfection of vagina is required only where venereal infection is suspected.

The thighs are covered with sterile sheets or footed drawers, the abdomen with a sterile sheet, and the patient is placed in dorsal position on the kitchen-table, which has been covered with a blanket or comfortable, a rubber sheet, and a sterile linen sheet. The thighs are flexed in exaggerated lithotomy position, and retained by a leg-support (Robb), an improvised sheet-sling, or upheld by an assistant; another assistant gives the anæsthetic, chloroform being preferred. The field of operation should be well illuminated, either by natural or artificial light.

The operator carefully prepares his hands, nails, and arms with soap, hot water, and nail-brush, followed by lysol and bichloride solution, just as he would for a major surgical operation, and draws on his rubber gloves, which have been well boiled (15 to 20 minutes).

He now makes an examination and determines accurately the presentation and position.

To the right of the operator should be a table, upon which is placed his pan of instruments (boiled 20 minutes), which contains, in addition to the forceps, tape for the cord, instruments for perineorrhophy and for packing the uterus in case of hemorrhage. Aseptic ergot, boric-acid solution for infant's eyes, sterile gauze in rolls and pledgets, vulvar pads, cotton and gauze sponges. Urethral and tracheal catheters should set within easy reach.

On the left hand should be a bench or table, holding basins of hot sterile water and hot one-per-cent lysol solution, with plenty of sponges. Experience in Chicago Lying-in Hospital service has convinced the writer that unsanitary and filthy conditions of the room where the operation is done, do not affect the result if the operator, and field of operation be properly prepared and aseptic sponges, pads, sutures, etc., be employed.

Let us assume that the operator has diagnosed the most common of the conditions which require instrumental help, namely, the head at the pelvic outlet, and rotation complete, or nearly so. He first passes the catheter as a routine measure, and then proceeds with the operation.

There are four steps or stages to the operation: 1. The application; 2. The adjustment; 3. The extraction; and 4. The removal.

Two principles control.

1. *Law of the Forceps.* The front of the forceps must look towards the point of direction (i. e., in

Plate I. Method of holding blade prior to introduction.

occipito-anterior cases the front of the forceps looks toward the occiput; in face cases, the chin, etc.).

2. *Rule of the Forceps.* Left blade first. Left blade in left hand, to left side of mother. Right blade in right hand, to right side of mother, last.

Two fingers of the right hand are passed through the vulva and into the vagina, on the left side of the fœtal head (also mother's left side); upon reaching the cervix the fingers pass inside again and inside the membranes. The flexor surfaces of the fingers should now rest against the left side of the fœtal head, *without any intervening tissue.*

The left hand now grasps the handle of the left blade in such a way that the first finger is above the hook and at right angles to it, the second finger below the hook, and the thumb on the opposite side. (Plate I.) The blade now swings easily in this grasp, and with no more force than that used in passing a male sound the tip of the blade is guided along the palmar surface of the two fingers of the right hand into the vagina and alongside the head. (Plate II.) As the blade enters, the cephalic curve adjusts itself to the head; the handle, which at first was almost vertical above the vulva (a little to operator's left), is now gradually depressed. (Plate III.) The grasp of the hand changes with the new position, until the full hand grasps the handle about the time the blade reaches a horizontal position, and the cephalic curve of the blade comes into its proper relation to the fœtal head. As the blade passes into the vagina, the thumb of the right hand instinctively guides and supports the lower edge of the blade. If the directions are carefully followed, the blade falls almost of its own weight into the proper relation, and the handle rests on the perineum. Two fingers of the left hand are now introduced in the same way into the vagina, on the right side of the mother and the right side of the fœtal head, and all maternal tissues and membranes are segregated on the extensor surface of fingers, while the palmar surface acts as a guide for the right blade, which, in the grasp of the right hand, is passed in a similar manner as above to the right side of the mother. (Plate IV.)

Second step. Adjustment. Operator now *sits down* in front of patient. The blades of the forceps now grasp the head with the cephalic curve, the front of the forceps looks toward the small fontanelle, and the pelvic curve is adjusted to the pelvis. The handles must now be *locked,* or adjusted, but before doing this, be sure that the blades grasp *only* the fœtal head, and no part of the mother or membranes; also, compress the handles, and at same time listen to the fœtal heart

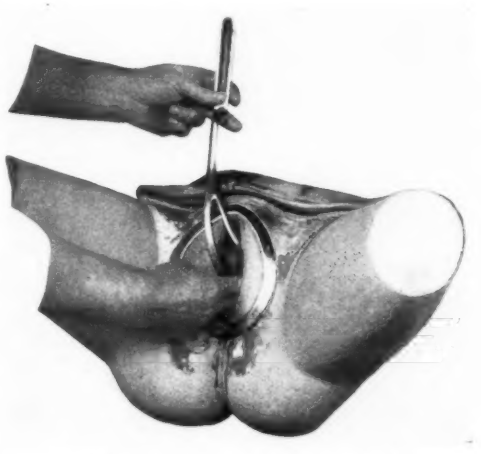


Plate II. Introduction of first (left) blade.

tones to be certain that the tips of the blades do not compress the cord and shut off the circulation. Now grasp each handle in right and left hands, respectively, and gently depress them to the perineum; if the right and left portions of the lock do not come into apposition, press down again and twist the blades slightly by pressure of the thumbs on the hook, and if this fails, press down, twist as before, and, in addition, pushs lightly into the pelvis. (Plate V.) If this does not succeed, remove the blades and reapply, as there is some obstacle preventing the proper adaptation. After locking, listen to the heart tones again.

Third step. Extraction. A gentle traction

Plate III. Simiultaneous progression of blade under control of fingers and thumb and depression of handle

(trial traction) will now determine if the blades lie properly, and the direction of the handles will indicate the direction in which traction should be made. In making traction all the force *may* be employed which can be obtained with the forearm flexed on the arm, and with elbow at the sides of the body, but in no case should we use more power than absolutely necessary. Simulate the gradual increase in power and the slow relaxation of the normal uterine contractions. Pull with the pains if possible, and attempt to produce good contraction, when absent, by massage.

No pendulum or side-to-side movements of the hands can be permitted, as they are unphysiological, and are many times injurious. Traction must be made along the line of the pelvic axis.

When traction is made, the handles should be grasped with both hands (Plate VI), at right angles with the long axis of the instrument, one hand over the lock, the other on the handle proper, the *thumbs underneath*, and with the elbows at the sides of the body. Make slow, even traction, a little downward from the horizontal plane, relax the handles, watch the fœtal heart tones, and then repeat. The intent is to produce an intermittent advance and recession of the fœtal head in imitation of the natural process.

The head soon begins to bulge the perineum, and the handles point more and more upwards, and indicate thereby the direction in which traction should be made. Sponge between tractions, and watch perineum. The nucha now comes under the pubes, and extension begins. Take

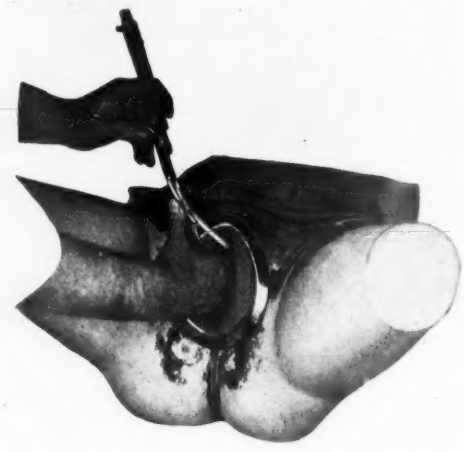


Plate IV. Introduction of right blade. Note the exclusion of the left blade from field of operation.

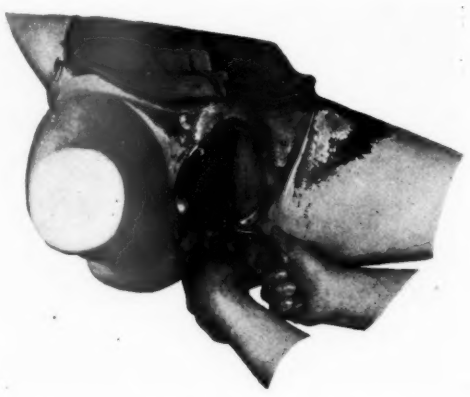


Plate V. Adjustment handles are grasped with thumbs on the hooks and depressed to lock.

plenty of time, guard the perineum, and when the head has passed the pelvic bones and extension is well under way, the blades may be removed and the head expressed by a modified Ritgen's maneuver. Episiotomy may be done if required.

The delivery takes place in obedience to the natural mechanism, and if blades are not removed, the operator stands at one side while the traction and vis à tergo bring the handles more and more over the maternal abdomen. (Plate VII.) The nape of the neck is kept close up against the symphysis, and as much as possible, one should allow the natural elasticity of the vulva to draw it back over the advancing part until the delivery of the head is complete.

Fourth step. Removal. Unlock the blades and lay them with one hand back in the pan or on a sterile towel, and let the head fall into the other hand. If the blades are removed while the head is still within the vulva, remove the right blade first, and be careful not to injure the ear of the child.

With the delivery of the head the function of the forceps terminates, and the extraction of the body and the conduct of the third stage follow in accord with their own laws and regulations.

Deep Transverse Arrest of the Head. This is the first deflexion position, and the one in which formerly the vectis was most frequently and successfully employed.

The ætiology and mechanism can be passed over here.

Diagnosis. The fingers enter the vagina and encounter the fœtal head in the plane of the pelvic outlet, lying with its long axis parallel with the transverse diameter of the pelvic outlet, the large

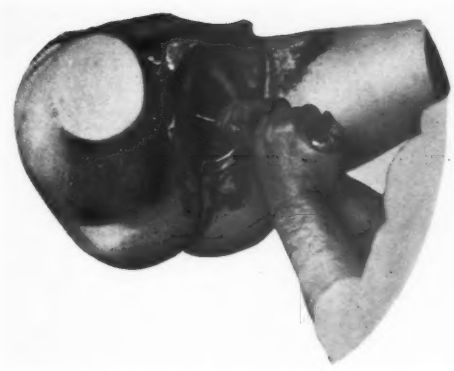


Plate VI. Extraction. Note position of hands and elbows. This position can only be secured by the seating of the operator somewhat below the field of operation.

fontanelle on one side, the small fontanelle on the other, and about the same level (sometimes the small fontanelle is slightly higher), connected by the saggital suture, against which the fingers impinge. The labor is at a stand-still and rotation does not occur. (Plate VIII.)

The arrest of the labor entails great danger for mother and child; for the mother, exhaustion, possibly sepsis or rupture of the uterus, necrosis of maternal tissues, with sequential vesicovaginal or rectovaginal fistulæ.

The child may become infected, the scalp or cranium necrosed, or the cord compressed. Death may occur from trauma or from the prolongation of the labor.

If danger for either mother or child is present, or, in the absence of such a menace, after a delay of two and a half to three hours without progress, the indication is definite to deliver with forceps. From a study of the cases it is probable that of all instances where the forceps are applied under strict indications, that deep transverse arrest is present in about thirty-five per cent. One need not be idle, however, during this period of delay.

The woman should be placed upon the side toward which the occiput points, whereby flexion is facilitated and pressure with the ends of the fingers upon the sinciput during a pain may be of great assistance in securing flexion. If this fails after reasonable trial, the half-hand may be carried in behind the posterior parietal bone, and an attempt made to rotate the occiput forward. Failing in this, the forceps may be applied.

The preparations are the same as before described.

In the peculiar application of the forceps lies the necessity for accurate diagnosis. The forceps blades are constructed for application to the sides of the head, but if so applied in "deep transverse arrest," they will lie in the anteroposterior diameter of the pelvis, which is not a satisfactory position for forceps with such a pronounced pelvic curve as the Simpson instrument has, neither can the blades lie in the sides of the pelvis, because the fœtal head would be grasped in its anteroposterior diameter, which is a bad position for the head, and an unfavorable one for the forceps. Hence a compromise is necessary, and the blades must be applied in one of the oblique diameters, with the pelvic curve toward the occiput. If the occiput lies to the woman's left, the forceps should be applied in the left oblique (i. e., a line passing between the blades lies in the left oblique diameter of the pelvis), the right blade resting on the anterior malar bone, and the left on the posterior parietal protuberance. (Plate IX.)

When the occiput points to the right, the forceps lie in the right oblique, etc.

The application presents some difficulties. The patient being in dorsal position on the table, with elevated thighs, the left blade is passed along the palmar surface of the right hand into the hollow of the sacrum behind the head, and *allowed to remain there if occiput points to the left*, while the right blade is introduced into the hollow of the sacrum and carefully rotated under the guidance of the fingers, over the face of the child to the anterior malar bone.

If the occiput lies to the right, the left blade is rotated into position over the anterior malar bone before the right blade is introduced.

Since the head is grasped in a larger diameter, care must be used to avoid too much compression on the head during traction; hence a finger or towel should be placed between the handles.

Plate VII. Delivery in extension, the handles pointing more and more upward. Operator stands.

Plate VIII. Deep transverse arrest of head. Note position of fontanelles and sagittal suture.

Two objects must be kept in view — rotation and extraction. The occiput should not be rotated forward directly, as some advise, for fear of lacerating the vaginal walls, but traction and rotation must be simultaneous, and about in the proportion of two traction to one of rotation. Occasionally, however, the vagina will be torn in difficult cases, in spite of every precaution.

After each traction the handles should be relaxed and the sutures and fontanelles examined to note progress. Readjustment of the blades should be made as often as necessary until they lie in the sides of the pelvis and grasp the sides of the fœtal head. After rotation occurs, the blades *may* be removed, and if the pains are strong, nature may be allowed to terminate the case, assisted possibly by Ritgen's maneuver (modified).

In most cases, however, the rotation will be followed by immediate extraction, since the necessity which requires interference carries with it the demand for delivery, which is now conducted on the principles described above for "low forceps."

The use of the axis-traction instrument for all cases requiring forceps is the rule in Scotland and Dublin, and the practice is not uncommon in France. In this case the axis traction forceps may be applied directly to the sides of the pelvis, irrespective of the position of the head; rotation occurs without interruption from the blades, and the results are generally satisfactory.

If the child is living and forceps have failed, symphyseotomy may be considered. If the child is dead, no attempt should be made to apply forceps, but, in behalf of the mother, the indication is absolute to perforate, crush, and finally extract the diminished head.

Plate X. Face positions require that the handles be raised to lock.

Plate IX. Occiput læva transversa. Blades grasp anterior malar bone and posterior parietal bone. Note interval between handles.

In Occipito-posterior Positions. When the occiput enters the pelvis in the posterior quadrant, the mechanism of the labor is considerably disturbed, and various complications are liable to appear. The effacement of the cervix and the dilatation of the os occur very slowly and unsatisfactorily, the bag of waters ruptures early, while, in addition, the contractions are irregular, shallow, ineffective, and extremely annoying to the patient. This is the second of deflexion positions and if flexion occurs at all, it is late. The labor is greatly prolonged. The head descends into the pelvis, and in course of time the occiput

frequently rotates, at least into the transverse (resulting in deep transverse arrest). It may, however, remain either obliquely posterior or rotate into the hollow of the sacrum.

To secure flexion and anterior rotation, a number of maneuvers have been advised.

a. Place the women on the side toward which the occiput points.

b. Pressure upward on the sinciput during a pain to produce flexion, whereupon rotation will most probably occur (Hodge).

c. Or by passing two fingers or the half-hand behind the fœtal ear, attempt to pull the occiput forward, while the other hand pushes on the forehead outside

d. De Lee. "A combination of internal and external manipulations. Flex the head from below, then pull the occiput forward, both maneuvers with hand in the vagina. From the abdomen first dislodge the shoulder by extending the child's body; then pull the breech down, so as to flex the axis of the fœtus strongly; then pull the shoulder to the front by operating on the back. Hold what you have gained, and repeat the manipulation if necessary. If the head can be pushed up, as it usually can be, so as to allow the inside hand to pass the promontory and reach the shoulder, the fingers may swing the child's trunk around so as to bring the back anterior. The occiput will now remain anterior."

Plate XI. Axistraction instrument. Introduction of left (first) blade. Whole hand should be introduced if necessary to guide the blade.

If these maneuvers fail or if some indication arises for the termination of the labor, the forceps should be applied.

Plate XII. Blades adjusted and bar grasped by the hands for traction.

If the head lies in the right or left oblique posterior, the forceps are applied to the sides of the pelvis as usual, and traction is made horizontally. This will result usually in slight flexion and some anterior rotation, which may bring about a transverse position of the head, whereupon the forceps should be removed and reapplied as for deep transverse arrest.

If, on the contrary, the occiput, during the maneuver, should rotate backward into the hollow of the sacrum, an attempt must be made to deliver the head in flexion.

The forceps are now applied to the sides of the pelvis and grasp the sides of the fœtal head. The front of the forceps is directed toward the forehead, which now becomes the point of direction. Traction is made upwards from the horizontal

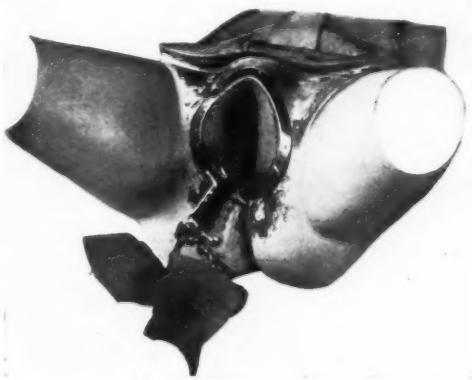


Plate XIII Rotation occurring as an effect of traction.

plane, in an effort to deliver the occiput over the perineum. The traction is carried more and more upward, the perineum bulges enormously, and probably tears, and as soon as the flexion of the head is sufficient, the occiput will deliver over perineum, and immediately the handles are *depressed* to the perineum to deliver the face from under the pubes.

If this maneuver does not succeed, Scanzoni's method may be attempted. The forceps are applied to the sides of the pelvis if possible, but for the safety of the mother the blades should grasp *closely* the sides of the fœtal head, the front of the forceps looking toward the face of the child. Traction is now made downwards until the occiput impinges on the pelvic floor, when a rotary motion is imparted to the blades, in addition to traction, whereby the occiput is slowly and intermittently rotated with the utmost care, first into a transverse and then into an occipito-anterior position. The forceps now lie upside down, and should be taken off and reapplied to the sides of the pelvis, and also to the sides of the fœtal head. The front of the forceps will now look toward the occiput, and the delivery will proceed according to the rules as first laid down. Axis-traction forceps may be used in these cases, and episiotomy should be done if necessary.

FACE-PRESENTATION

These cases nearly always will terminate spontaneously, if given time enough; hence no interference is indicated until danger to mother or child threatens.

The first and second stages of the labor are greatly prolonged; the head seems to be engaged long before the biparietal diameter has passed the inlet.

The anterior rotation of chin does not occur until the face is well down on the perineum, and it takes a very long time, but this rotation *must* take place, and the chin *must* reach a point anterior to the transverse diameter of the pelvis, for otherwise the labor is greatly prolonged and many complications are liable to arise which imperil both mother and child, and may easily cause a condition *impossible* of delivery.

The craniotomy set should be boiled with the rest of the instruments.

Where the chin is fully rotated, the introduction of the blade takes place as usual, but the second step differs materially.

The adjustment *usually* is secured by depressing the handles until the two members of the lock come into apposition, when they are slipped together; in face cases, however, the handles are *raised* toward the symphysis until the blades, sinking deeply into the hollow of the sacrum, grasp the parietal bosses, then the two members of the lock come into apposition and the adjustment can be made. (Plate X.) The front of the forceps looks toward the chin.

Third step. Traction carefully *downward* until the chin in forced extension is brought well under the symphysis, and then the handles are carried upwards to deliver the occiput. These actions are just the reverse of the motions used in delivering the head in an occipito-posterior position.

In cases where the chin is not fully rotated to the front, the conditions met with are practically the same as in deep transverse arrest, but much more serious for the child. The application is made as described under deep transverse arrest, except that the blade which passes over the face is carried directly into position to avoid rotating it over the face and neck.

The blades grasp the head from forehead to chin, which is extremely dangerous for the child, on account of the possibility of fatal compression of the blood-vessels.

Traction must be made with extreme care, and frequent unlocking of the forceps.

Traction and rotation must be simultaneous, and governed by the same laws as in deep transverse arrest.

If child is dead, do craniotomy in behalf of the mother.

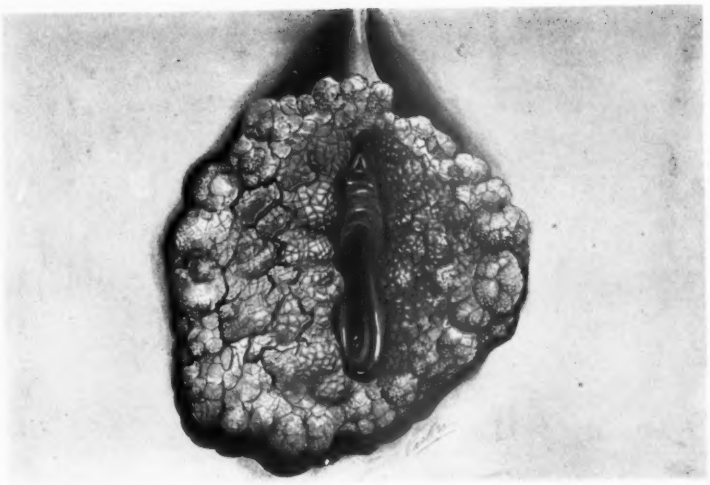
HIGH FORCEPS

The axis-traction instrument is used by many obstetricians for *all* operations in which forceps are required.

In the hands of good operators, such use is not unsatisfactory, and in the hands of a poor operator, or of one who does not or cannot make an accurate diagnosis of the position of the head, it has obvious advantages, since it is applied rigorously to the sides of the pelvis without reference to the position of the head. Thus the mobility which the perfection of the instrument confers upon the head in a measure compensates for the failings of the operator, and relatively less injury may be done to the patient in a certain percentage of cases.

The intent of the instrument is twofold and both are fulfilled. It confers upon the operator the ability to make traction in the axis of the inlet, and it confers upon the head a certain amount of mobility.

It is therefore evident that its greates value will be found in those cases where the head is fixed in the inlet and where after prolonged labor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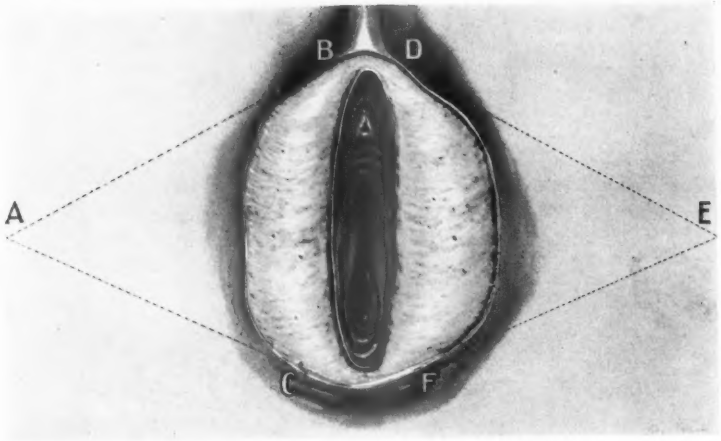
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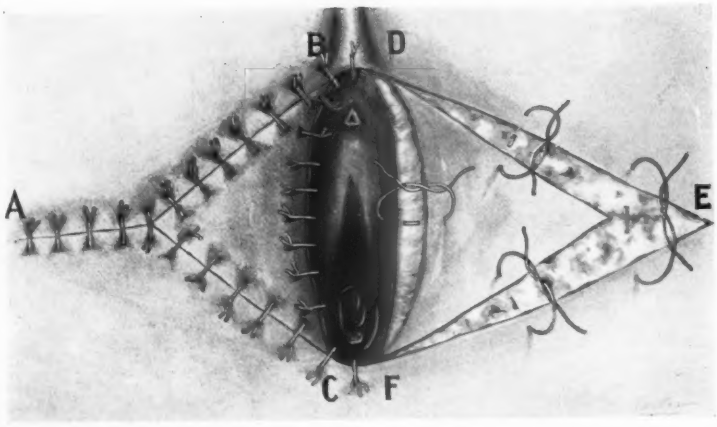
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it seems possible to help the head into the pelvis by traction (vis à fronte), or where the head is fixed in or somewhat below the inlet, and some indication arises on the part of mother or child to terminate the labor.

The forceps should *not* be applied to the head floating above the inlet, unless version is impossible and some necessity exists for rapid delivery.

The conditions and preparations given previously for the use of forceps must be observed with the minutest care in this operation, for great injury may be produced upon mother or child, or both.

APPLICATION

The right hand is carried into the vagina, and through the cervix to the left side of the head as it lies in the pelvic inlet. The left blade in the grasp of the left hand is passed along the flexor surface of the right hand as a guide until the cephalic curve receives the head. (Plate XI.) The right blade is now passed in a similar manner, the left hand being introduced to serve as a guide. The blades now lie in the sides of the pelvis, to which the pelvic curve of the instrument readily adapts itself. The head, however, is usually grasped in the antero-posterior diameter, or very near it.

Second step. *Adjustment* is executed exactly as for low forceps.

After the adjustment the blades are locked by the thumb-screw, which holds the blades of the instrument firmly and prevents disarticulation. Next, the transverse bar with the universal joint is applied to the metal arms, which descend from the attachments back of the fenestræ in the Felsenreich model.

Third step. Traction is made on the horizontal bar entirely, and in such a direction that the portions of the descending bars which run parallel with the application handles will lie almost in contact with the application handles. The first traction is a trial traction, to see if the blades hold and are properly adjusted. (Plate XII.)

The patient may be then placed in Walcher's position, and eight tractions are allowable, assisted, if necessary, by the compression of the head from above by an assistant, who endeavors, at the time traction is made, to press the head through the inlet by means of a hand placed upon the head above the pubes. (Wiegand.)

When the head passes the inlet, the normal rotation begins (Plate XIII), and as it reaches the outlet, rotation being complete, the forceps may be taken off and reapplied to the sides of the child's head, or Simpson forceps substituted.

In some cases the forceps may be removed and the natural forces complete the delivery.

After the head passes the inlet, the woman is restored to a dorsal position on the table, with thighs elevated, and the case is managed according to the principles laid down for low forceps.

The application of forceps under strict indications and carefully observed conditions has a surgical importance equivalent to an amputation above the knee, and should not be entered upon or attempted without equivalent preparations and safeguards.

A PLASTIC OPERATION FOR COVERING THE EXPOSED VULVAR SURFACES WITH SKIN AFTER EXCISION OF EXTENSIVE GROWTHS OF THE VULVA

By E. C. DUDLEY, A. M., M. D.

Professor of Gynecology, Northwestern University Medical School

The purpose of this communication is to set forth the technique of a plastic operation for the covering of extensive surfaces which are exposed by the removal of large growths about the vulva. The illustrative case was one of condylomata acuminata, and is shown in Fig. 1.

After excision of the growth, the exposed surfaces were so broad that they could not be covered by drawing together the margins of the wound in the ordinary way, that is, the larger margin, B, D, C, F, could not be approximated to the smaller margin around the vulvar orifice. In order to cover the exposed surfaces, therefore, deep incisions were made, as indicated by the lines AB, AD, DE, and EF. These incisions permitted the cutaneous triangles ABC and DEF to be slid towards the vulva, as shown in DEF, Fig. 3.

The sutures partially tied in Fig. 3 indicate where the final lines of union will be situated. The sutures completely tied and forming the lines of union ABC in Fig. 3 show the operation complete on that side of the vulva. The exposed surfaces on the opposite side will be united in like manner.

NORTHWESTERN UNIVERSITY MEDICAL SCHOOL
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TECHNIQUE OF REMOVAL OF TUMORS OF THE LARGE INTESTINE CAUSING OBSTRUCTION

By S. C. PLUMMER, M. D., Chicago
Professor of Operative Surgery, Northwestern University Medical School

Of course the ideal way of treating a tumor of the large intestine causing obstruction is to resect the bowel and do an immediate end-to-end anastomosis. Von Mikulicz, however, called attention to the fact that the mortality of this procedure was unreasonably high, and he, as well as other surgeons, adopted a method of operating in two sittings with far better results.

As a type of the latter class of operations, I submit the following case.

Mrs. A. E. M., aged 42, housewife, married, four children.

Family History. Negative, except that one sister died of tuberculosis.

Eleven months ago, patient suffered from what was apparently dysentery. Since that time she has had several attacks of partial intestinal obstruction.

Examination. Abdominal palpation. In left iliac region can be felt the bowel, evidently with thickened walls, which rolls under the examining finger. (At the operation this was shown to be the upper part of the sigmoid).

Vaginal Examination. A hard mass, palpable high up in pelvis, on left side; apparently some connection with the uterus, but rather freely movable.

Rectal Examination. Negative.

It was decided that the obstruction of the bowel was in the lower part of the sigmoid.

Operation. February 9, 1906, at Wesley Hospital. Vertical incision through left rectus muscle, extending upward from a point just above Poupart's ligament. Hard tumor found bound down to posterior abdominal wall. Tumor about one and a half inches in diameter, with a well-marked constriction at its middle.

A loop of the ileum, which was adherent to the mass, was loosened, and a slight thickening on this loop removed with scissors. Three stitches were inserted to close up the denuded surface.

The left tube, about three quarters of an inch from its fimbriated extremity, was attached to the mass, as was also the left ovary; these were separated by blunt dissection from the mass.

The mesosigmoid was now divided close to the abdominal wall, being first seized with forceps. Opposite the middle of the growth the mesosigmoid was involved and much shortened; this portion was allowed to remain attached to the growth after being separated from the adjacent portion of the mesosigmoid. After ligating the cut surfaces of the divided mesosigmoid, it was possible to bring the tumor out through the abdominal wound. The left tube and ovary were now removed.

The cut edges of the sound mesosigmoid and the adjacent surfaces of the two limbs of the loop of bowel leading up to the tumor were now stitched together, except in the immediate neighborhood of the tumor.

The tumor and adjacent portions of the loop being now held outside the abdomen, the parietal peritoneum was stitched to the loop of bowel all the way around, and the remainder of the peritoneal incision closed. The fascia and skin were then united, except where the loop escaped. A longitudinal incision was now made in the proximal portion of the loop and a glass tube tied in by means of a running stitch of catgut. A roll of gauze, covered with gutta-percha tissue, was inserted under the free portion of the loop, and the tumor and loop surrounded by gutta-percha tissue. Dressing applied.

February 11th, under gas anæsthesia, the tumor was cut off with scissors. There was a small area of gangrene in the tumor. The tube was previously removed, and, after the section, was inserted into the cut end of the proximal limb and tied in with a catgut ligature. On February 14th this tube was removed.

On February 17th a large artery-forceps was applied to the spur between the two limbs of the bowel. On February 21st this came loose. Between the blades was found a piece of tissue one and a fourth inches long. The clamp was reapplied, and on February 23d again came loose, having now seven eighths of an inch of tissue between its blades, thus making altogether a communication between the two limbs of intestine a good two inches long.

The artificial anus could now have been closed, but, on account of suppuration in the abdominal wall, this was delayed till March 3d, when, under gas anæsthesia, the bowel was loosened from the surrounding tissues and the open ends sewed together. Skin flaps were loosened up and united over the bowel. Primary union.

During the operation I regarded this tumor as cancerous, but microscopical examination by Professor Zeit proved it to be of inflammatory origin.

NORTHWESTERN UNIVERSITY MEDICAL SCHOOL

Department of Gynecology

OPERATIVE TECHNIQUE IN WESLEY HOSPITAL

By ROBERT GILLMORE, M. D.

Instructor in Gynecology

The operative technique used in the gynecological service at Wesley Hospita differs omewhat in several details, from that employed in the other departments. "Institutional treatment" is avoided as much as possible.

As soon as the ward patients enter the hospital they are given a tub-bath, after which a complete history is obtained. This is followed by a physical examination of the chest and abdomen, and completed by a bimanual pelvic examination. A complete urinalysis is supplemented by a blood and bacteriological examination if indicated, and the findings are recorded on the history-chart.

The surgical procedure will be considered in order, and from the following standpoints:

1. Preparation of the patient. *a.* Preliminary. *b.* Immediate.
2. Preparation of the operating-room and accessories
3. Preparation of the surgeon and assistants.
4. Anæsthesia.
5. Operative technique

1. *Preliminary Preparation of the Patient.* This comprises the care of the kidneys and intestinal tract.

a. Preliminary Preparation. The urinary system is generously supplied with fluids, a liquid diet, and at times saline enemata is ordered to stimulate elimination.

Intestinal tract. Severe catharsis is avoided, as the loss of too much fluid by the prima viæ deprives the urinary system of the necessary amount of fluids, weakens the patient, and thus retards and lengthens the period of convalesence. If the bowels have been moving daily, one or two purgative enemas are always administered as a routine measure in operative cases; the last enema not more than six hours before the operative hour, in order to avoid, if possible, movements of the bowels during the operation. While the patient is in the ward, the abdomen and pubis are shaved, scrubbed with green soap and sterile water, and a dry sterile dressing is placed over them.

b. Immediate Preparation. The patient is brought to the preparation-room a few minutes before the time set for the operation. Soon after the anæsthetic is begun, both abdomen and vagina are antiseptically prepared, irrespective of the route chosen for operation. Sterilized gauze sponges are used in scrubbing the parts with green soap and sterilized water. Special care is taken to thoroughly cleanse the umbilicus. The entire surface is rinsed with water, then 95 per cent alcohol poured over it, and finally a 1-2000 solution of bichloride of mercury. The abdomen is covered with a towel which has been saturated with 1-2000 solution of bichloride of mercury. The vulva and vagina are prepared in the same manner. The old process of macerating the skin for the previous night has been abandoned. The reasons for this are: 1. Maceration of the skin is harmful, as it interferes with the normal reparative processes. 2. It has been demonstrated that the results are equally as satisfactory in emergency cases where the time has not allowed such extensive preliminary preparation. 3. By the old method the patient was deprived of much needed rest the night before the operation.

2. *Preparation of the Operating-room and Accessories.* The seating capacity of the ampitheater is 130 seats. This is flushed daily with a hose. The electric chandeliers hanging over the operating-table are wiped off twice daily with a cloth dimpened with a solution of bichloride of mercury. The tile floor is scrubbed after each operation with soap and water. After septic cases, the floor is washed with a five-per-cent carbolic

solution. Two sets of hand-basins that have been sterilized by steam for 45 minutes, containing respectively a solution of 1-4000 bichloride-of-mercury solution, one half of one per cent of lysol, and plain sterilized water. Another basin contains 95-per-cent alcohol. Five pairs of freshly sterilized gloves, without punctures, are placed in a basin of sterilized water.

The operating-table is provided with a soft rubber pad, which mitigates, to a greater or less degree, the aching of the muscles following the day of operation. This pad also protects the patient from contact with the cold metal or glass of the table.

The dressings, sponges, towels, etc., are first laundered in Wesley Hospital. They are then placed in special receptacles devised by Miss Louise Johnson, head surgical nurse, and so arranged that the steam, during the sterilization, can penetrate every part of them. Before removing from the sterilizer the openings are closed. Moist sterilization is employed at fifteen pounds pressure for forty-five minutes, and the articles to be sterilized are allowed to remain in the sterilizer until dried.

The chromicized catgut is prepared under the direct supervision of the head surgical nurse, by the following process:

1. Soak in ether for ten days. Ether changed three times.

2. Wind on glass reels.

3. Soak in chromic acid, 1-1000, for from 6 to 12 hours. It is important to dry it 48 hours, otherwise it becomes soggy.

4. Sterilize in a supersaturated solution of boiling crystals of ammonium sulphate (Merck's) for twenty minutes.

5. Thoroughly rinse with sterile water and keep in sterile jars filled with sublimated alcohol.

Preparation of the Instruments. The instruments are scrubbed and boiled after each operation. Immediately before an operation they are again sterilized; after which they are arranged on the instrument-table. In case there is any delay in beginning the operation, the instruments and dressings are covered with a sterilized towel.

Preparation of Sponges. The laparotomy sponges are placed into packages of six, and counted by the senior surgical nurse. The junior nurse again counts them before wrapping them for sterilization. The number of sponges in each bundle is again verified by the sponge nurse, when opened for use at the operation.

3. *The Preparation of the Surgeon and Assistants.* The surgeon's dressing-room is provided with four wash-bowls. Hot and cold water are controlled by " foot-faucets."

After changing their street-shoes for canvas slippers, the surgeon and assistants wash off the street dirt from their hands. White duck trousers and short-sleeved coats are substituted for the every-day suit. Arms and hands are scrubbed to the elbows with sterilized brushes and liquid green soap for five minutes. The nails are next cleaned, and a new brush, sterilized soap and water, are used for ten minutes. The hands and arms are immersed in 95-per-cent alcohol, then rinsed in a half-per-cent solution of lysol, and finally immersed in 1-2000 solution of bichloride of mercury. Sterilized gowns are put on, and the hair and mouth are covered with sterilized gauze. The operator and his two assistants wear sterilized gloves during the operation.

The assistant nurses follow the same aseptic preparation in regard to their hands, gowns, covering of hair, etc., as that employed by the surgeon. Both the instrument and the sponge nurse use sterilized gloves. When a nurse assists in a septic case, she is laid off for twenty-four hours before assisting in a clean case.

4. *The Anæsthetic.* The usual anæsthetic, unless contraindicated, consists of administration of nitrous oxide, followed by ether to complete the narcosis. The apparatus used is Clark's nitrous oxide gas apparatus, improved by Dr. Harry M. Richter, and admits of the administration of ether without changing the face-mask, thus facilitating the narcosis and obviating the risk of the patient becoming partially conscious during the change from gas to ether. The administration of the gas lessens the amount of ether required for complete anæsthesia, and modifies the disagreeable features of the second stage. The amount of ether used for an anæsthetic approximates four and a half ounces every half-hour. The quantity used depends upon the individual's tolerance.

Scopolamine and morphine have been employed to a limited extent in plastic work and curettage.

5. *Operative Technique.* For the sake of brevity, the operative technique will not be described in detail, but the general improvement which has developed from experience will be mentioned. Chromicized catgut is used for both intra-abdominal and skin suturing. In abdominal cœleotomy a short incision 2½ inches in length is made immediately above the symphysis down to the fascia of the recti muscle. The fascia is cut and the muscular fibers separated by blunt dissection. The peritoneum is then lifted by two forceps, opened with a scalpel, and the opening increased with scissors to the size of the skin incision. The incision is enlarged after exploration, if required. At this point the Trendelenburg position is usually

employed and continued up to the time of closing the abdominal wound. From then on, the surgical procedure depends upon the character of the operation.

In tubal inflammations it is the exception to leave the remaining tube when one is involved. Experience has demonstrated that in the majority of such cases, where conservative surgery has been done, a secondary operation often has to be performed upon the other tube for salpingitis Unilateral salpingitis is as unusual as unilateral bronchitis. The hemorrhage due to severing the tube is controlled by suture ligation with chromicized catgut. The raw peritoneal surfaces are covered to prevent adhesions. This is usually accomplished by the purse-string suture.

As a routine measure, the condition of the appendix, gall-bladder, and kidneys is investigated. The appendix is examined, and if the patient's condition warrants it, it is usually removed, regardless of its pathology.

TECHNIQUE OF APPENDECTOMY

1. The mesentery of the appendix is clamped and cut.

2. A circular incision is made, about three fourths of an inch from the appendiceal base, and a cuff of peritoneum stripped down with dry sterile gauze.

3. Dr. T. J. Watkins has recently modified his technique of the next procedures. The appendix, denuded of its peritoneum, is grasped firmly with an artery-snap and drawn up until the expanded portion is reached. This is crushed with an eight-inch forceps, and a small chromicized ligature is placed at the lowest part of the crushed portion nearest the base of the appendix.

4. The left index finger, covered with a piece of dry gauze, is placed under the denuded portion of the appendix, and the excision is made by cutting through the crushed portion with a scalpel, on the gauze. As the mucous surface is reached, the stump is cauterized with carbolic acid, and the excess of acid neutralized with alcohol. The stump of the appendix retracts within the peritineal cuff.

5. The mesentery and the peritoneal cuff are tied with the same ligature. The fat in the mesentery is tied over the stump as an extra precaution.

In making a purse-string suture at the base of the appendix, it is practically impossible to prevent puncture of the mucosa. The importance of eliminating this source of infection, which the above procedure effectually does, has been recognized by several abdominal surgeons.

Drainage. Abdominal drainage is rarely used in the gynecological service, owing to the special advantages offered by draining through the vagina.

Vaginal drainage or packing is resorted to only for positive indications, as, for example, where it has been necessary to operate during an acute pelvic inflammation and where the pus has escaped into the peritoneal cavity; also, to control an occasional obstinate capillary oozing. The following procedure has been used for the last five years.

When the operative work has been completed, and just before closing the abdominal wound, the end of a strip of sterilized gauze two inches in width, and so folded that there is no raw edge, is placed in the pouch of Douglas. The gauze strip is carried from one side of the pelvis to the other, and posterior to the uterus, until the area to be drained is covered. After the gauze is cut off, the abdominal wound is closed and a record kept of the length of the strip left in the abdominal cavity.

The posterior fornix of the vagina, which has been previously prepared, is exposed. The vaginal mucosa is put on a stretch, and an incision made behind the cervix, through the mucosa and peritoneum of the pouch of Douglas. The gauze drainage is grasped with a forceps, and drawn through the vaginal opening.

The abdominal wound is closed in three layers, each with a continuous layer of chromicized catgut. Chromicized catgut No. 1 is used for the peritoneum, No. 2 for the fascia, and No. 1 for the skin.

The wound is covered with gauze, and a light pad of the same material is fastened with adhesive straps. Collodion has been abandoned because it retains the perspiration, and thus favors slight skin infection. Combination dressings are no longer used, because they increase the secretions of the skin by keeping the wound area too warm, and because they are uncomfortable to the patient, especially during hot weather.

Removal of the Gauze Drainage. In 24 to 48 hours after the operation, the gauze is usually removed with the aid of nitrous oxide anæsthesia.

NEW TECHNIQUE OF NEPHROPEXY

"BASKET-HANDLE OPERATION"

BY AXEL WERELIUS, M. D.
Surgeon to St. Bernard and Englewood Hospitals

Having operated only one case, this is not a report of results, but merely a record of the technique.

After having exposed and delivered the kidney through wound, the capsule is split and deflected, as in Fig. 1 (*à la* Ferguson and Edebahls). Then proceed as follows:

STEP 1. Cut with scissors two flaps, as indicated by dotted line in Fig. 1, and tie to end of each flap a strong silk ligature armed with needle, as in Fig. 2.

STEP 2. Push kidney down in the wound. Draw the inner ligament or flap through the quadratus lumborum, and the outer through the thinner muscles in front of the fascia; if necessary, puncture with artery-forceps. The remaining border of the deflected capsule may be sewed to the transversalis fascia, or from it you may cut a small strip and use that for suture material, uniting capsule and transversalis fascia (as in McArthur's method for hernia).

STEP 3. Unite muscular layer over the kidney. The kidney is then drawn up against the denuded muscles by the artificial capsular ligaments, the ends of which are tied in a knot, and this is transfixed by a silk suture. The silk ligatures used in pulling the ligaments through are cut off. The united flaps thus from a "basket-handle" from which the kidney (basket) is suspended, as in Fig. 3.

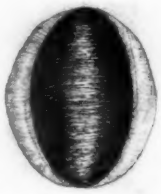

Fig. 1

Fig. 2

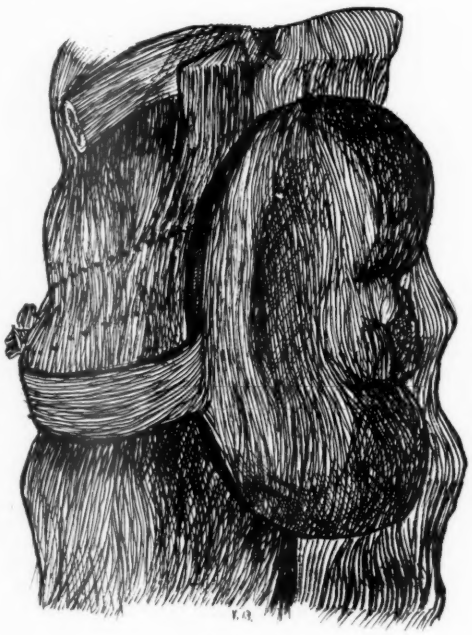

Fig. 3

The operation is simple, and surely greatly effective, because, besides getting the adhesions between cortex and muscle, upon which some operators only rely, you get a living ligament, or at least a strong fibrous band suspending the kidney.

Instead of two, four flaps may be cut, as suggested by Dr. Wyllys Andrews.

NORTHWESTERN UNIVERSITY MEDICAL SCHOOL
Department of Surgery

A TEMPORARY SPLINT FOR FRACTURES OF THE LEG

By ALLEN B. KANAVEL, M. D.
Professor of Surgery, Post Graduate Medical School; Clinical Instructor in Surgery, Northwestern University Medical School

Owing to the difficulty of maintaining the ordinary blanket splint in position, some years ago I began to use the following modification. It recommends itself not alone because of the excellent results obtained, but also because of its simplicity and the ease with which it is applied. Indeed, it is so simple that it may have been used by others besides my friends or in the wards of the hospital, but if so, I have never seen it used or described. The fractured leg is placed in this appliance for several days, until all œdema has subsided and all superficial abrasions and tangent blisters are completely healed.

It might be called a box-blanket splint, for it combines the advantages of each. A blanket is folded sidewise so that its width is about three and one-half feet, then two boards of that length, six inches broad and one in thickness, are secured, and one folded into the blanket at either end, so gauging their position that as they are folded over and over and meet in the middle, they will lie closely approximated edge to edge. Now turn the whole over end for end, and set it down so that the two boards stand on edge and parallel, and it will be seen that the intervening blanket makes a trough in which the leg may be suspended as in a swing, with the boards approximated to each side of the leg. (Fig 1) It is essential that the boards shall be of such a width that when the leg lies in this swing it will not touch the bed. Now use as little cotton as possible, placing a small roll in the popliteal space and some laterally over the bony prominences, and possibly a little about the heel, but for the most part the blanket will accommodate itself to the shape of the leg. So far we have described one form of the well-known ordinary blanket splint. Now comes the important part of the technique. The leg is placed in the blanket splint above described. The boards are brought up snugly to the sides, and we now nail a third board, similar in size and shape, to the ends of the boards in the blanket, extending approximately a foot and a half to either side, so that we have a T-shaped box-blanket splint, with this advantage over the blanket splint, that it never tips from side to side, thus calling for frequent adjustment, and superior to the box splint, in that it fits the leg accurately, suspending it in a swing which is always adapted to the leg, no matter what changes may take place in its size, as a result of the post-traumatic swelling. A strip of a roller bandage is tied around the upper end of the splint, at the level of the knee, to reinforce that end. (Fig. 2.) There is no wadding of cotton at one point to the exclusion of another. Generally, by the time the swelling has subsided a complete relaxation has been secured, incident to the easy position of the leg. The bones are in proper position, or so nearly so that with but little manipulation the leg is ready for the cast. If desired, for instance, in treating a severe compound fracture, it may be left in this dressing until union is complete.

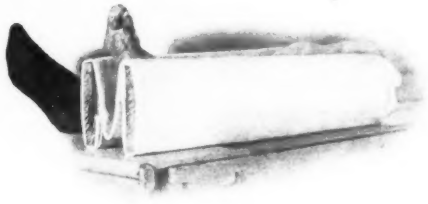

Fig. 1. Showing boards approximated to sides, and eg in swing.

Fig. 2. Showing third board nailed in position. Reinforcing bandages around upper part of splint are not shown in the picture.

TRANSACTIONS OF SOCIETIES

THE SOCIETY OF CLINICAL SURGERY

REPORTED BY J. G. MUMFORD, M. D., BOSTON, MASS.

The sixth meeting of the Society of Clinical Surgery was held in Baltimore on April 13th and 14th, and proved as interesting as any of its predecessors. All of these meetings have been remarkably successful, due largely to the novel methods pursued, and members have come to feel that the results attained and the information conveyed are more striking and important than is the case with any other surgical meetings which they attend. After this experience of three years, it is hoped that organizations with similar purposes and methods may multiply. It is not only that men come to learn intimately and at first-hand the accomplishments of their associates, but there is established a familiarity and a delightful give-and-take relationship, which adds greatly to the enjoyment of such professional gatherings.

Members met at the Hotel Belvedere, and proceeded at once to the Johns Hopkins Hospital, where they gathered in the gynecological operating-room.

DR. H. A. KELLY (by invitation) opened the proceedings by performing his operation for suspension of movable kidney, approaching the organ posteriorly through the superior lumbar triangle. He anchors the kidney low, without displacing it through the abdominal wall, passing one stitch about the twelfth rib, and securing the kidney further by three additional stitches. He does not split the capsule. Dr. Kelly then discussed renal ptosis, and referred especially to certain vague pains, not immediately referable to the kidney, of which patients complain,— pain suggesting appendicitis, lumbar caries, or inguinal hernia. If the kidney be suspected, the diagnosis is made sure by injecting a sterile fluid through the ureter into the renal pelvis, when, promptly, the patient will exclaim, "That 's the old pain." Dr. Kelley demonstrated this maneuver successfully on a patient before the society, illustrating by artificial hydronephrosis the condition actually present.

DR. MAX BROEDEL (by invitation) then gave an extremely interesting address, with sketches and illustrations, on the development of the kidney, dwelling especially upon the arrangement of the callices, and their relation to the renal pelvis, blood-supply, and ureter.

Members then adjourned to the general operating-rooms of the hospital, where Dr. Harvey Cushing showed an infant, operated upon four days previously by craniotomy for birth-pressure paralysis, from subdural hemorrhage. Improvement was already evident, and the wound was healed. Dr. Cushing pointed out that these cerebral lesions from hemorrhage at birth are probably far more common than is supposed, and that even with absorption of the clot, and partial or complete subsidence of the paralysis, a cyst or scar may remain, giving rise subsequently to focal epilepsy. Dr. Cushing also showed a number of patients illustrating admirably the good results obtained by his present method of removing the Gasserian ganglion. He spoke also of his operation for decompression, removing a large bone flap for brain tumor, emphasizing the relief secured even when the tumor cannot be removed. He then operated upon an adult patient, the victim of Jacksonian epilepsy.

DR. J. C. BLOODGOOD then demonstrated, in a case of double inguinal hernia, his present method of relieving that condition, insisting especially upon the simplicity of his technique, with non-transplantation of the cord and the use of the internal oblique fascia, instead of the rectus, for closing in large hernial openings. Dr. Bloodgood then showed a large series of interesting cases demonstrating successful end-results: Giant cell sarcoma, curetted from the tibia three years ago, the patient now well and walking about; a case of giant-cell sarcoma removed from the radius by resection of the growth one year ago, the patient now well, with a useful hand and arm; a case similar to the tibia case, well twelve years after operation; a patient illustrating a good result after Finney's pyloroplasty; a case of gastric disease presented for diagnosis, the long-standing symptoms having suggested ulcer with pyloric obstruction, the patient being now well after one week of medical treatment; a case of dislocation and fracture of the internal condyle of the humerus, with an excellent result after partial resection; a case of cancer high in the rectum, now well, nine months after removal of the growth through the abdomen; a case of Banti's disease

with very large spleen, now well, nine months after exposing and packing the spleen; a case of bone cyst of the humerus, cured by curetting and drainage; two cases of cancer of the breast, both well, fourteen years after removal of the tumors; and a similar case, well after five years; a case operated upon for the rare condition, double thyroid cyst, now well; a child vigorous and well after the operative and fresh-air treatment for tuberculous peritonitis.

Dr. J. M. T. Finney then showed an extremely interesting case. A vigorous man of seventy, the victim, for some months, of aneurism of the right subclavian artery. Dr. Finney had operated upon the man three months previously, tying the innominate, which was involved, and tying the subclavian beyond the aneurism. The man now appears perfectly well, with good use of his arm. Dr. Finney also showed a case of fracture of the lower end of the humerus, from which he had been obliged to excise fragments just above the joint. Function was excellent. Dr. Finney then operated for cancer of the sigmoid flexure, without apparent metastasis.

After luncheon in the surgical building, members repaired to the laboratory of surgical pathology, where Dr. Bloodgood gave an interesting demonstration of his method of teaching surgical pathology, and dwelt especially upon the nature and results of operating in case of various forms of tumor. Members then met in the anatomical laboratory, where Dr. R. G. Harrison (by invitation) gave a demonstration of his method of the study of experimental embryology, showing how the young embryos of certain amphibians may be grafted and partially transplanted in a variety of ways. He spoke especially of the methods of transplanting the limbs and torsos from one species of frogs' embryos to another, and showed specimens of the developed hybrid tadpoles and frogs. This demonstration, unusual in the experience of practising surgeons, was found to be extremely suggestive; for, as is well known to embryologists, it seems to open up new avenues of research, and point to the solution of many obscure questions.

The society left the hospital at half-past four in the afternoon, and after enjoying a drive about the city and park, dined together, and held a business meeting at the Country Club in the evening.

On Saturday, April 14th, members assembled in the general surgical building of the Johns Hopkins Hospital, where Dr. H. H. Young (by invitation) demonstrated his method of conducting a genito-urinary dispensary. He then gave an informal talk on prostatectomy, and discussed especially operations for cancer of the prostate. He spoke of a series of one hundred and fifty cases of prostatic enlargement which had been operated upon in his service, with seven deaths; and he called attention to the fact that about thirteen per cent of these enlarged prostates are malignant. In nearly all cases he advocates operation by the perineal route, according to his well-known method, and in order to distinguish malignant cases he made the following points in diagnosis: Early and persistent induration, rapidity of development, small size of the growth, infrequency of hæmaturia until late, the constant and somewhat indefinite pain, which may be in the hips or sacral region, and the early involvement of the seminal vesicles. These symptoms, combined with examination by the cystoscope, will establish the diagnosis. The speaker then spoke of his perineal operation for removal of the malignant prostate; rectangular incision, section of the bulbous urethra, and freeing of the prostate with the vessels and trigone, removal of the whole invaded area, anterior to the ureteral openings, closure of the bladder wound and reuniting of one angle of the bladder wound with the distal urethral stump. This description was illustrated with admirable drawings. Dr. Young then conducted the society to his operating-room, where he performed for them, in a brilliant manner, the operation of perineal prostatectomy for non-malignant disease.

Members then adjourned to the anatomical building, where Dr. Florence Sabin (by invitation) gave an interesting address on the development of the lymphatic system, showing how she began work by using young pig embryos, injecting aniline blue beneath the skin. The earliest development of lymphatics was found to be in the region of the hip and the next in the neck; later, the lymphatics, which are true vess ls, and not mere tissue spaces, spread over the body, radiating especially from a deep sac in the neck, which Dr. Sabin has named the lymph heart. The speaker showed a number of illuminating preparations and corrosions, showing how the lymph-vessels follow the course of the veins especially, and form the thoracic duct. She also spoke of the formation of lymph-nodes from the lymph heart, as well as in other parts of the anatomy.

Dr. Joseph Erlanger (by invitation) then addressed the society, describing the condition known as heart-block, and its relation to Stokes-Adams disease, illustrating the condition by producing artificial heart-block on the dog.

Dr. W. H. Howell (by invitation), in the physiological laboratory, then demonstrated on the dog the heart, isolated by the method of Martin,

Porter, and others, with its nutrition maintained through irrigation of the coronary arteries with Ringer's solution, and showed the action of the accelerator nerves on such a heart, which by these processes may be revived and stimulated to a normal rhythmicity several hours after death.

Dr. W. H. Welch (by invitation) then favored the society with a delightful address, dealing with certain problems of immunity, and their relation to surgical operations. He prefaced his remarks by showing and commenting upon three interesting microscopical specimens, — an appendix enlarged through excessive connective tissue thickening, suggesting a new growth, but without involvement of the mucosa; tissue sections containing numerous examples of the spirochetæ pallida of syphilis, abounding especially in the sweat-glands, and two interesting specimens from Ehrlich's laboratory, illustrating mouse cancer undergoing transformation into sarcoma. Speaking of surgical operations in disease, Dr. Welch further took as his text the fact that when we operate we deal generally with abnormal conditions against which the normal physiological processes of the organism are already striving, so that we have as our allies these natural processes, inflammations and the like; our effort being to remove the source of disease and trust to nature to combat and remove its secondary manifestations. Nature has a perfect mechanism for dealing with physiological problems; her method of dealing with pathological problems is imperfect.

After lunching in the physiological building, the society visited the Hunterian laboratory, where Dr. W. S. Halsted (by invitation) demonstrated on dogs his suggestive experiments for the partial occlusion of arteries by metallic bands, noting how these bands constrict the vessels, burying themselves in the adventitia, but not necessarily damaging seriously the nutrition of the distal parts. Dr. Halsted also showed a method of performing end-to-end intestinal suture, — a modification of Maunsell's method, but obtaining his traction by sutures passed through the wall of the gut, instead of by lateral section and opening of the gut.

Dr. Harvey Cushing then gave a demonstration of his methods of teaching students in surgery, through practice in operative technique and operations upon dogs. Among other interesting details of this animal clinic, he showed how two of his students, Mr. Heuer and Miss Henry, were producing experimental cardiac valvular lesions, and demonstrated dogs in whom such lesions had been produced.

The society then adjourned, to meet in Philadelphia next October.

OBSTETRICAL SOCIETY OF PHILADELPHIA

Stated meeting, Thursday, March 1. 1906, at 8:30 P. M.

The President, Dr. Wilmer Krusen, in the chair.

Symposium on the Treatment of Backward Displacements of the Uterus

THE ALEXANDER OPERATION

Dr. Charles P. Noble admitted that the uncomplicated retrodisplacements of the uterus cause fewer symptoms than the same displacements complicated by other morbid conditions, but rejected the claim of certain gynecologists, that uncomplicated retrodisplacements give rise to no symptoms and require no treatment. He agreed with the majority of gynecologists, that retrodisplacement of the uterus is a morbid condition, and that in most patients who consult the physician, it is the cause of symptoms *per se*, and a predisposing cause of congestion of the uterus, of hypertrophy of the glandular structure of the endometrium, with resulting leucorrhœa and of prolapse and congestion of the ovaries, and that in a certain percentage of cases without any specific infection of the vagina or endometrium, the uterus and ovaries become adherent. These remarks apply to non-puerperal cases. Uncomplicated retroversion of the puerperium leads to subinvolution of the uterus and to post-puerperal hemorrhages and leucorrhœal discharges. Therefore he argues that so-called uncomplicated retrodisplacements of the uterus should be cured not only to relieve the symptoms which exist, but to prevent ensuing complications. The Alexander operation he regards as the operation of election in nulliparous patients, especially in unmarried women. In such patients the pessary will not keep the uterus in position, and in many cases does positive harm. In other cases it will keep the patient comfortable as long as it is worn, but as a result the patient is tied to the physician's office. In puerperal cases, the tampon to promote involution,

followed by the Smith-Hodge pessary, will cure probably one third of the cases. In married women of the child-bearing age, when the pessary keeps the uterus in position and the patient comfortable, its use is rational, and preferable to operation. In all other uncomplicated cases, Dr. Noble believes that the Alexander operation should be performed. He has done this operation about two hundred times. A careful study of 95 cases shows the following results:

Anatomical failures	1
Anatomical cures	94
Symptomatic cures	75
Partial symptomatic cures	12
Symptomatic failures	7
Number of pregnancies (three patients pregnant three times; three patients pregnant twice)	39
Complications during labor	0
Number of miscarriages (one patient had three miscarriages)	9

In its proper field, Dr. Noble regards the Alexander operation the ideal one. The objections urged that the limitations of diagnosis render it probable that unsuitable cases will be operated upon, he thinks, can best be refuted by the statement that after thirteen years' experience with the operation in about two hundred cases he has had no trouble from this cause. The operation is never done in the presence of history of infection and peritonitis, nor unless an examination under anæsthesia shows the uterus to be freely movable and the adnexæ without palpable disease. When these conditions cannot be met, the Alexander operation is rejected and the abdomen opened.

INTRAPERITONEAL SHORTENING OF THE ROUND LIGAMENTS

Dr. J. M. Baldy considers that other surgical operations than the intraperitoneal shortening of the round ligaments for backward displacement of the uterus are inadequate. He does not believe that the round ligament is the natural support of the uterus, or that it gives more than a slight assistance in this direction; nor does he believe that any one element brings about a uterine displacement. The one and only consequence of the displacement—and it must be admitted that it is a serious one—is the secondary effect on the prolapsed appendages. Any operation which does not take this factor into consideration, and which does not as surely correct the prolapsus of the ovaries as it does that of the uterus, cannot be considered competent. Such, he says, is the case in the Alexander operation in all its varieties, as well as in the ventrofixation and suspension operations; and this criticism he regards as true of the majority of intraperitoneal round ligament operations. The operation which he is in the habit of performing, and which is frequently designated by his name, obtains its results through the use of the round ligaments. The broad ligaments are perforated from their posterior surface by forceps, which, on emerging on the anterior surface, are made to grasp the round ligaments, which are thus drawn through the posterior surface with the forceps. The round ligaments are brought together and sutured both together and to the uterus low down in its posterior surface, at about the position of the internal os. This accomplishes three things: 1. The tilting forward of the uterus to a normal anterior position; 2. The lifting up of the whole pelvic floor from its sagging position; 3. The uplifting and support of the ovaries and tubes. One who has not seen the result, Dr. Balby asserts, can have no conception of its completeness, and is in no position to discuss its merits.

THE OPERATION OF VENTROSUSPENSION OF THE UTERUS

Dr. Henry D. Beyea said that the anatomical ætiology of retrodisplacement of the uterus is resident in a great many supporting structures and conditions, and that no operation yet devised completely corrects the cause. No operation has accomplished much more than does the pessary, where this instrument succeeds. The operation selected to gain the desired result should be of the simplest technique, the least mutilating and dangerous, should not disturb function, should have the greatest freedom from recurrence and surgical complication, and must of necessity be performed through an abdominal incision. These factors of success in his study of over five hundred cases during the last thirteen years have been most satisfactorily gained through a method of ventrosuspension. Reviewing the literature, he finds that nearly all complications which are said to ensue occurred in operations performed before 1896, when ventrofixation was performed, not ventrosuspension, and in about as many a true fixation operation is described. He says that the literature shows no proof that ventrosuspension has caused complication. Dr. Beyea described 42 cases of pregnancy and labor following operation, and in no instance was there a complication attributable to the suspension. Also, in none of the five hundred cases operated upon did ileus or other accident follow. Statistics show that recurrence may take place in six per cent of cases, as it did in one per cent of his own cases.

Recurrence in his cases was due to constant coughing during immediate canvalescence in four cases. In one case, where the retroversion was congenital, the cause remained abnormally active, and the ligament was stretched out until it measured four and a half inches. In the cases in which cough developed or retroversion was congenital, he would also apply a pessary for a few weeks. He believes that recurrence would be less frequent if the operator would include a few fibers of the rectus muscle in the silk on each side of the incision. By this method he has found ventrosuspension to be one of the most satisfactory operations in surgery.

SHORTENING THE ROUND LIGAMENTS BY SUBPERITONEAL VENTROAPONEUROTIC FIXATION

Dr. John M. Fisher stated that the title of his paper had reference to the operation of shortening the round ligaments as first practised by Gilliam, modified by Simpson, and finally perfected by Montgomery. The abdomen is opened, the round ligament of one side is picked up about one and a quarter inches from its uterine attachment, a traction strand of silk or catgut is passed beneath it, the two ends of which are threaded into the eye of a Deschamp ligature-carrier, the latter is introduced through a button-hole opening between the folds of the broad ligament, following the course of the round ligament; upon reaching the abdominal wall the point of the carrier is thrust through the abdominal musculature and aponeurosis about three quarters of an inch above the margin of the pubic bone and about one and a half inches from the median line. The ends of the strand are released from the carrier and the latter is withdrawn. Traction upon the strand drags the knuckle of the round ligament held by its loop through the opening thus made. The round ligament of the opposite side is dealt with in like manner. After securing the necessary tension of both ligaments for holding the uterus in a median forward position, the proximal side of each hook is sutured to the abdominal aponeurosis to the extent of about three quarters of an inch. The traction strand is withdrawn following the fixation of each ligament. The abdominal opening may be closed in accordance with the choice of the operator. The crescentic abdominal incision, as suggested by Stimson, is of especial value in uncomplicated cases. The following advantages are claimed for the operation:

1. The uterus remaining free from adhesions simulates the normal in its position, mobility, and in its behavior during pregnancy.

2. The stronger and more muscular segment of each ligament is utilized, which possesses in no slight degree the properties of elasticity and contractility, and undergoes compensatory evolution and involution during pregnancy and parturition.

3. No lesion is left in the pelvis or abdomen as a direct result of the operation for the formation of preternatural bands and adhesions.

4. The prolapsed ovary is raised to a higher plane and a better circulatory level.

Since January 11, 1904, Montgomery performed the operation on 142 patients. The writer continued to practise ventrosuspension until convinced of the superiority of the new method, after having assisted in the performance of the operation many times and examined patients subsequently to determine results. During the past eleven months Dr. Fisher has practised the procedure in twenty-six cases, without a death and with the most gratifying results. Pregnancy and labor following the operation had been observed in three patients without noting anything abnormal.

Dr. William Easterly Ashton, from the standpoint of treatment, divided retrodisplacements into the recent and chronic cases. By recent cases he means those which have not existed over a year. These, he believes, can, at times, be successfully treated by the pessary in association with local and general treatment. He recognized the necessity in both chronic and recent cases, that the essential plastic work upon the pelvic organs and floor should be done. In the treatment of chronic retrodisplacements, in his judgment the pessary has no place. Occasionally it may be possible to get a symptomatic cure with a pessary in the so-called uncomplicated cases, but this method is of doubtful value, because of the difficulty of knowing whether there are complications until the abdomen is opened. Although Dr. Ashton has for a number of years been an advocate of ventrosuspension, during the last year he has been shortening the round ligament. From his experience he believes that the operation on the round ligaments giving the best results is the Furguson-Gilliam method. The normal pull of the round ligaments from the points where they emerge from the pelvis is too far posterior to bring the fundus of the uterus well forward, and the ordinary round ligament operations, therefore, fail to give results. Dr. Ashton explained that a uterus in a perfectly normal anterior position will have its fundus raised in the pelvis by making the round ligaments taut. Another objection to the usual methods of shortening the ligaments pointed out by him is the fact that after the ligament is made taut there is always a certain amount of

the ligaments which will be pulled out from the inguinal canals, thus defeating the effect of the operation. It is not possible to get the fundus of the uterus well anterior in any form of round ligament operation, except it advances the abdominal ends of the ligaments. This is done by the Furguson-Gilliam operation. In reply to the criticism that an operation of this kind does not suspend the uterus in position, he said that this was true, but that so long as the intestines are posterior to the uterus, the uterus must stay anterior, and this the Gilliam operation accomplishes. If the intestines get in front, the uterus is pushed backward, and it is because of the tendency of this latter condition to occur where the ligaments are not advanced that he advocates the Gilliam operation.

Dr. Frederick H. Maier stated that it might be well to divide the treatment of retrodisplacements of the uterus into the treatment of the complicated cases and of the uncomplicated. The uncomplicated cases so rarely give rise to symptoms, that treatment is unnecessary. In the complicated cases with the manifestation of symptoms besides the displaced uterus, there were frequently some pathological conditions of the ovaries, tubes, and pelvic perineum. These changes might be primary or secondary to the displacement, and invariably require remedying, as well as the retroflexion or retroversion. He divided operative treatment of retrodisplacements into three heads — the intra-abdominal, the extra-abdominal, and the vaginal. Concerning the extra-abdominal means, Dr. Maier thought possibly in very rare instances in unmarried women physicians might be justified in doing the Alexander operation. The intra-abdominal method therefore seemed to be the operation of choice in most cases. He referred to Dr. Montgomery's broad conservatism in his thorough trials of the various operative procedures in his efforts to find an ideal method for the maintenance of the uterus in its normal position, the result of which has been the operation which Dr. Fisher so ably described, and which, Dr. Maier considered, undoubtedly possessed all the advantages of the other procedures, with none of the disadvantages. He stated that ventrosuspension was rejected some time ago, and that ventrofixation was done only upon women of advanced age, and, excepting the case which Dr. Montgomery had of mechanical ileus, the results had been fairly good. He said no operation so fully gave the impression that the uterus is swinging in its normal position as the Montgomery modification of the Simpson-Gilliam-Furguson operation. He referred to what Dr. Baldy had said about the ideal operation being one that would not only maintain the uterus in a forward tilt, but would lift up the ovaries, tubes, and broad ligaments to their normal plane, and stated that Dr. Baldy's operation could never raise the ovaries, tubes, and broad ligaments to as high a level as does the Montgomery operation, because it acts more particularly upon the central part of these organs, whereas the other takes the strongest part of the round ligament about an inch from the side of the uterus, introduces it beneath the peritoneum, and carries it thus subperitoneally through an opening in the rectus muscle fascia. In this way not only is the uterus maintained in its normal plane, but the appendages are, as well. In the Montgomery operation the ovaries and tubes are maintained at a higher plane in a forward position, and the operation is done subperitoneally. Next to the Alexander operation, he thought it the most physiological operation in use. He regarded it as possible that those who had not done the operation many times or followed its course might think, when they saw the round ligaments introduced into the small openings in the anterior surfaces of the broad ligaments, that it bunched the peritoneal tissue. While it does in the beginning, the peritoneum soon accustoms itself to changed conditions, and this is soon rectified. In many cases he had found the uterus to be maintained at a much higher level than following ventrosuspension. The ovaries and tubes were well up, and the patients complained of no symptoms.

Dr. Theo. A. Erck observed that some operators seemed to be too much wedded to the operation usually employed by them. He thought judgment should be reserved until a trial had been made of the individual methods. As was well known, none of the operations gave ideal results. He had done many ventrosuspensions by the Kelly method, and knew of only one recurrence of retrodisplacement after a subsequent labor. He had also employed the intra-abdominal methods of shortening the round ligaments a number of times in suitable cases. Having assisted Dr. Baldy in his work, he resorted to his method, and had applied it in probably a dozen or more cases during the last year and a half, without excluding entirely other methods. He believed Dr. Maier had not done or seen any such an operation as that done by Dr. Baldy, since he said that it did not elevate the pelvic organs; Dr. Erck stated that of all the operations he had seen, if there was one that did restore the normal position of the uterus, and lifted the ovaries and tubes to a desirable level, Dr. Baldy's operation, it seemed to him, did it most completely. His own experience with it had been very satisfactory. He

had had occasion to reopen a patient, for the development of an ovarian cyst, nine months after an operation of this kind, and found that the round ligaments which had been attached to the posterior surface of the uterus at the level of the internal os were so smooth that they looked like the normal attachment to the anterior surface.

Dr. L. J. Hammond said that if physicians were to follow the example of the various advocates in dealing with the retrodisplacement of the uterus, both success and failure would result, and that that was precisely what his experience in the use of several of the methods spoken of had been. Physicians, he said, go through the various stages of enthusiastic advocacy of a method, and then discard it with as pronounced emphasis as they had advocated it while in use. Shortly after his graduation he began the use of the pessaries with the expectation that he would secure perfect results in every case; but his disappointment was early realized. Shortly after this the use of ventrofixation came into use, and the failures were far more numerous than the successes. Then followed ventrosuspension, and extraperitoneal suspension of the round ligament, and broad ligament fixation, and here, again, failures were noted. His own experience had been that better results had been secured by the Alexander operation and ventrosuspension than by any other method he had employed. In the cases in which the Alexander operation had been a failure, he had found, upon opening the abdomen, that the uterus was so fixed that to employ any of the other methods would have been meddlesome. To deal alone with the pathological conditions was quite sufficient to secure as good symptomatic results as would be secured had resort been made to any of the fixation procedures. Freeing the adherent uterus and prolapsed and bound-down ovary made uterine suspension unnecessary. Structural changes in the organ itself were more the fault than any ligamentous changes could possibly be, hence hygienic, dietetic, and sanitary treatment should be vigorously employed before any operative treatment is considered.

Dr. Swithin Chandler recalled that in the late eighties he remembered Dr. Goodell speaking of the great trouble that the ordinary physician had in regard to displacements of the uterus. In a short while after that, the Alexander and Adams operation followed, and since then he believed there were about one hundred other operations upon the round and other ligaments, and upon the uterus itself. He referred to an operation he had seen performed, in which the operator brought the uterus clear outside into the vaginal canal and stitched it there. He considers the field for the Alexander-Adams operation an extremely limited one. If the operation is done, it is impossible to correct the pelvic and abdominal diagnosis, and while many disliked to think that the diagnosis could be corrected, he thought it was at times desirable to do so, and to remedy the same, and at the same time to correct the deformity or displacement. In opening an abdomen he had seen adhesions existing, which, had an Alexander operation or an Alexander-Adams operation been done, would not have been discovered. It would have been impossible in doing such an operation to diagnose this condition. Small tumors which in time become large cannot be diagnosed in the Alexander operation. He considers Webster's operation on the round ligaments one of the best he has seen. Fixation, ventral, vaginal, or otherwise, he condemned, except it be in the old or in exceptional cases.

Dr. Chandler thought Dr. Beyea's paper full of judgment and good common sense, and agreed with him that any operation upon the round ligament must to some extent macerate the tissue; that if there is any infection of the tubes or other tissues, there is the liability of setting up some trouble in this disturbed tissue. He believes that the circulation is interfered with more than in ventrosuspension, and complications are more liable to ensue.

In regard to the claim made in the beginning of ventrosuspensions, that there was much trouble in confinements, he agreed with Dr. Beyea that it was due to the fact that the operations were ventrofixations and not ventrosuspensions. It was even said that the bladder gave much trouble. In a series of cases, however, in which he examined the bladder, the trouble was caused by some condition of the bladder itself, and not because of the operation. It seemed to be forgotten, he said, that there was a long ligament in ventrosuspension. Upon opening the abdominal cavity he had found this to be as much as two and a half inches in length. The normal ligaments acting to support the uterus in its correct position, the suspensory ligaments simply a long fibrous band having now outlived its usefulness. This cannot, however, interfere with pregnancy. He also has been carrying out the infolding of some of the muscle fibers in the suspension for several years, and approves of it. In an examination of over two hundred cases, the failures had been very small.

In the round-ligament operations, in his opinion, there is more liability of adhesions between the uterus and the abdominal and pelvic walls. He has not had the experience which other gentlemen

have had in these round-ligament operations, but has done the several operations two or three times, and they have not met with his approval. In one case the round ligament was so extremely small that the operation was not attempted. He emphasized the remarks of Dr. Beyea, and thought physicians should cling to that which is known to be good—the ventrosuspension.

Dr. George M. Boyd, after listening to the discussion, concluded that each operation has a field of usefulness. If it is possible to diagnosticate a case of uncomplicated retrodisplacement, then, surely, the Alexander operation has a field of usefulness which hardly any one can question; but in the complicated cases he thinks the intra-abdominal operation would be better. With an increasing experience in obstetrics each year, he felt that physicians should resort to the suspension operation during the child-bearing period with great caution, remembering that infection may occur, and the case supposed to be a suspension may become one of fixation, and give trouble. Dr. Boyd had previously reported several very serious complications, one in which the labor was so prolonged that sloughing of the bladder resulted. In another case it was necessary to induce premature labor, and within the last two weeks it had been necessary for him to do Cæsarean section upon a case of fixation performed about eight years ago. In this case the anterior wall of the uterus occluded the pelvic canal; and any other operation than Cæsarean section was out of the question. The patient is now doing well. He feels that the operation for the individual case should be selected. He called attention to the importance of not fixing the uterus when it was intended only to suspend it, in view of the complications which are likely to arise during pregnancy.

Dr. John C. Da Costa stated that he did not think that any operation for old chronic retrodisplacement of the uterus a satisfactory one, unless the abdomen is opened; otherwise it cannot be known what changes have taken place. In the Alexander operation he thinks the risk is taken of doing a great deal of damage. He took exception to Dr. Boyd's remarks in regard to the dangers of ventrosuspension. It was a danger he had yet to encounter. In 1895, when the American Medical Association met in Baltimore, he had a long talk with Kelly, and learned just how to do that operation. Since then he had had no mishaps. He had such a case of infection as Dr. Boyd mentioned, a couple of years ago, in which he operated, thinking there was little complication. When he opened the abdomen, however, he not only had to break up adhesions, but also to resect the ovary. Ventrosuspension was done, but by some mishap the wound became infected. He was very anxious about the case, but saw the patient in August, in New England, and found, upon examination of the abdomen, that the uterus was normally suspended, and this week she brought in a very well developed six months' baby as the result of her marriage.

Dr. Da Costa thinks the suspension operations, so called, are failures, because they are fixations. People think they must put a great many ligatures through the uterus well into the abdominal wall and use strong ligatures. He uses two very fine (not over No. 2) silk sutures, taking up the peritoneum and fascia and only a little bit of the muscle, tying the ligatures in the middle line. He does what he thinks is necessary, and puts one, possibly two, through-and-through silver sutures back of the uterus to prevent any stripping off of the peritoneum from the abdominal wall. Unless care is taken in this particular, there may be stripping down of the peritoneum, and inflammation set up with fixation. He believed that if physicians would do as Kelly does, they would find that the operations will be almost universally successful. Ventrosuspension has served him so well for so many years that he does not feel like abandoning it, notwithstanding the arguments brought forward for the other operations.

Dr. Daniel Longaker summed up in a very few words his feeling with regard to the propriety of the procedure; that is, that the treatment of retrodisplacements of the uterus consists in the treatment of its complications. It was quite a few years to go back to the days of the Smith-Hodge pessary, and interesting to note the evolution and development of the treatment; and probably the results in that far-distant day were quite as satisfactory as those of to-day. He desired to hear from the medical sisters on this question.

Dr. Marie K. Formad stated that at the Woman's Hospital they selected their cases and did a Gilliam, Alexander, or a ventrosuspension operation, as the case indicated. She had done a number of ventrosuspensions, and had had pregnancy occur, with no complications, and the uterus had remained in position. Lately, she and Dr. Purnell had been doing the Gilliam operation, and, so far as known, the cases had done well. They had done the Alexander operation in a number of cases, with very good results. She remembered a failure in one case. The rule, however, was to select the operation for the case.

Dr. Sarah H. Lockrey indorsed Dr. Formad's remarks, and said that during her service at the Woman's Hospital they had tried all these methods.

She had seen no complications from the ventrosuspension operations that had been performed. That is the operation of her choice.

Dr. Charles P. Noble, in closing, stated that he was quite eclectic in his practice; that, aside from the operation described by Dr. Baldy, he had done all of the operations many times, the suspension operation far oftener than any other, and recently he had done the Simpson operation quite often. He has done the Alexander operation about two hundred times, and has never had any trouble from bad diagnosis in his hands. Trouble is avoided by rejecting the Alexander operation in all cases in which the diagnosis is unsatisfactory, and especially in cases in which there is a history of infection. The operation, as he does it, is for uncomplicated cases. He therefore considers Dr. Baldy's objection to the Alexander operation purely theoretical. With infection and peritonitis, the cases are not appropriate ones for the Alexander operation. In the case of a virgin, the only possibility of pelvic peritonitis, aside from mechanical cause, is that she should have tuberculosis, and it is largely in young women that this operation is done. He thinks it the ideal operation for uncomplicated cases of retroversion. He has had no trouble with it; the longer he does it, the more he likes it, and the patients are quite satisfied with it. He wished to know why a woman with retroversion without complications should wait for complications before operation was done for a cure. Every month he sees cases in which that foolish plan has been followed with very bad results. He gave as an example an operation he performed upon a woman less than a year ago, who was a wreck from an originally uncomplicated retroversion which had not been cured. Ovarian complication, present when she consulted him, made it necessary to open the abdomen and resect one ovary. He did the Simpson operation, and the patient has been perfectly well since. If the woman had had an Alexander operation done six or eight years ago, it would not have been necessary to do this recent operation, and she would have been well all these years. Recently he opened an abdomen because the woman had been treated with pessaries and tampons for eight weary years, with the result that both the ovary and uterus were adherent. He believed it was unnecessary that these patients should be tampered with until they have complications, instead of curing them in the first place. He has another patient in the hospital now, who has suffered for fifteen years from an uncomplicated retroversion. He opened the abdomen because the uterus had become very large and she had much pain. The uterus was about three times its normal size, and there was fibrosis of the ovaries. In his judgment, had she had an Alexander operation fifteen years ago, this condition would not have arisen. In such cases he thinks the Alexander operation is ideal.

Dr. Noble agreed with Dr. Baldy that the only way to judge an operation was to do it. While he had never done the operation, it seemed to him to combine most of the bad points of the different operations. He described it as a round-ligament operation, which depended upon the poorest part of the round ligament—that which is in the inguinal canal. It is not anatomical, because when the operation is completed the parts are not in the position in which nature placed them, and it seemed to him the nearer the normal is approached, the more nearly correct is the surgery. There are other operations that are not ideal that give good results, and he accepted Dr. Baldy's statements relative to the good results which he gets with this operation, even though it is not ideal.

Dr. Noble agreed with Dr. Beyea that suspension is a good operation. He had done it about five hundred times. He believed that in from five to ten years less will be said against it than is said to-day. When he had done about three hundred cases, he had had five per cent of failures. In two hundred Alexander operations, he had had a single failure, one half of one per cent. He stated that in cases in which a comparison can be made there were two objections to the suspension operation, not present in the Alexander operation: 1. There is a little more danger in opening the abdomen than in not opening it; 2. There is the possibility of infection which will possibly result in fixation instead of suspension. This happened two or three times in patients from the Johns Hopkins clinics, as done either by Dr. Kelly or his assistants. In these cases, Cæsarean section became necessary.

He thinks the operation described by Dr. Fisher an excellent one, and has done it repeatedly. He remarked, however, that it is *sub judice* as yet, and thinks it will be better known five years hence than it is now.

Dr. Baldy, in closing, said that he was surprised at Dr. Noble's skill in diagnosing uncomplicated retrodisplacement; further than that, he did not believe that he could always make the diagnosis as he said he could. The matter was one of a difference of opinion, and he believed that every man is mistaken oftentimes. To say that uncomplicated retrodisplacement causes catarrhal conditions, he thought, was rank nonsense; that it causes endometritis, was worse. As to its caus-

ing adhesions, he did not believe it ever did. He and Dr. Noble, he said, stood upon entirely different ground in respect to what could occur; therefore, acting in accordance with their convictions, it was not surprising that they should arrive at diametrically opposite conclusion. Dr. Noble says, "Why wait?" Dr. Baldy says, "Why operate on a neurasthenic patient?" He feels that the conclusions drawn from the statistics given in the papers of Drs. Beyea and Noble differ very much from the practical expe ience of the men who run across the cases. Although Dr. Beyea practically never, according to the statistics, had bad results, Dr. Baldy had recently seen a case, which he thought was Dr. Beyea's, in which there was no relief until he had removed the uterus. This was not a congenital displacement, but had occurred in a multiparous woman. The misleading character of answers to questions was well known, and he thought every man read the returns according to his own desire. He would not believe either of the gentlemen's statistics, and stated that he had seen some of the letters in answer to questions by Dr. Beyea, and the cases were far from cured if the statement of these letters was to be believed. In reply to the criticism of Dr. Noble that the round ligament does not give support, and that an operation upon it is a distortion of nature, he asserted that the Alexander operation was as much a distortion, for it is done on the round ligaments, which do not naturally support the uterus. Dr. Baldy objects to the term "natural support" only when it is said that his operation is unnatural and that the others are natural. He declared that all are unnatural, without exception. Dr. Baldy's claim is, that the operation which he does accomplishes as much as any of the other operations for restoring the uterus to a good position, and doing so, does no possible harm, and is therefore superior. Dr. Baldy asserted that there is not one of the operations which lifts the ovary up, provided it is prolapsed of its own accord in addition to the prolapse due to the midplaced uterus. In Dr. Baldy's procedure the prolapse due to the elongated ovarian ligaments is corrected, which is not done in any one of the other methods mentioned.

Dr. Baldy called attention to the possibility of adhesions in operations which he and Dr. Webster were doing, and exhibited the specimens in a case in which he had removed the uterus six months or a year after he had done an operation. On the anterior surface of the specimen a point was observed where the round ligament had gone through the broad ligament, and on the posterior surface there could be seen the place where it had emerged. It was noticeable how thoroughly fan-shaped in the lower segment of the uterus from both sides the ligament came together and spread out, being almost as thin as the peritoneum itself. This point, he claimed, was too low to be a factor in complicating pregnancy. The uterus was inclined forward in an anterior position, and was supported at the only part of the broad ligament having power to uplift the ovary.

Dr. Beyea, in closing, said that the round ligament operations had never appealed to him, for the reasons stated in his paper. The suspension ligament in the specimen shown by Dr. Baldy appeared to him to be rather short and the uterus normal, and the wonder to him was that he had removed such a uterus. He reiterated his belief that ventrosuspension, properly performed, is the easiest and least mutilating operation devised, and one which does not complicate pregnancy or labor. It has given him excellent results. Recurrence is not present in more than four per cent, which, he believes, is less than that of any well-tried round-ligament operation. He regards it of great importance that a few fibers of the rectus muscle on each side of the incision be included in the silk sutures.

Dr. Fisher, in closing, said he desired to congratulate Dr. Noble upon his diagnostic ability. He remarked that he had served an apprenticeship in gynecology, extending over a good many years, during which period he had come into contact with men of large experience in gynecological work, and he was forced to say that there had been comparatively few cases of retrodisplacements with symptoms in which conditions of some kind were not found that were unsuspected previous to opening the abdomen. From all accounts, he is almost forced to admit that there are men who can palpate a kink in a normal ureter and outline other equally attenuated structures in the pelvis; but he likewise knows that every now and then a man of this class makes a mistake in diagnosis where he happens to succeed. On the other hand, he at times finds that he is in error while other men's opinions are confirmed, and it is not an infrequent occurrence to find an abdominal section reveal abnormalities that were separately diagnosed by different men, while each in turn may have failed to recognize that which was diagnosed by any one of his confreres. If, therefore, Dr. Noble's diagnostic ability is of the character intimated, he believes the time has come for many to take a course in gynecology under his instruction. If, as Dr. Baldy has said, it was only the complications which gave rise to symptoms, he would inquire the excuse for doing over two hundred Alexander operations at the hands of one man, for it was well known that

women rarely consult doctors concerning pelvic conditions without first experiencing pelvic symptoms.

Concerning ventrosuspension, he has seen the abdomen opened in a number of cases following this operation, in which the uterus was so firmly fixed to the abdominal wall that there was the appearance of one structure, and the so-called suspensory ligament in other cases has varied from one to four or more inches in length. In one intance there was scarcely a sign of the ligament left. He declares that there is no muscular structure in connection with the suspensory ligament; that it is simply an adhesion band analogous to cicatricial tissue; and that, as such, it is inconstant in its length, its thickness, and in its sustaining powers. If it were possible, he would much prefer to examine the five hundred cases referred to by Dr. Beyea, and draw his own conclusions. Statisticians, he thought, too often found that for which they were looking.

In reference to the Alexander operation, he considers it scarcely suitable, except for one of Dr. Noble's "extraordinary capabilities in the diagnosis of intrapelvic conditions."

Of the twenty-six cases operated upon by Dr. Fisher according to the Montgomery method, there occurred one suppuration of the abdominal wall. After cicatrization of the parts, he had found the uterus just as mobile as at the time of finishing the operation. Had this occurred in connection with a suspension operation, he believed the organ would in all probability have become fixed.

Referring to the Gilliam operation, he said that while Dr. Gilliam is entitled to credit for first utilizing the uterine segment of the round ligament for abdominal fixation, the operation as practised is an abomination, because upon its completion three openings are present, through which intestine may slip and become strangulated. In doing the operation as advised by Dr. Montgomery, no preternatural openings are created, and no raw surfaces tending to the formation of adhesions are left within the pelvis. The strongest portion of the round ligament is utilized, which consists not alone of fibrous tissue, but likewise has an admixture of muscular fiber analogous to the musculature of the uterus,—a structure, therefore, not so liable to subsequent overstretching, as is the case with the pseudoligamentous band in connection with the suspension operation.

COLLEGE OF PHYSICIANS OF PHILADELPHIA

Stated meeting, Wednesday, March 7, 1906, at 8 P. M.

The President, DR. ARTHUR V. MEIGS, in the chair.

EXHIBITION OF A PATIENT IN WHOM GASTROENTEROSTOMY FAILED TO RELIEVE HÆMATEMESIS AND OTHER SYMPTOMS IN CONNECTION WITH DUODENAL ULCERATION

DR. WILLIAM L. RODMAN exhibited this patient, a young women aged 22 years, who had been the subject of two previous operations before coming under Dr. Rodman's care. One was for a supposed hepatic abscess, at which time the appendix was also removed; the second was for the vomiting of blood following a fall downstairs, in which the abdomen had been struck upon the old cicatrix. On January 13th, while exercising in a gymnasium, the patient had strained the abdominal muscles, and had again vomited blood, and was brought into the accident service of the Medico-Chirurgical Hospital, where Dr. Rodman saw her. Gastroenterostomy for ulceration of the duodenum was done on January 21st. Four hours afterward she began to spit blood, and later vomited blood freely, and by 2 A. M. she had vomited almost a gallon of blood, and was completely exsanguinated. Adrenalin was used by hypodermoclysis, and ice locally. Hot water was introduced into the stomach at a temperature of 125°, by a stomach-tube. In this way a pint and a half of hot water was given with 10 grains of tannic acid. There was no fresh hemorrhage, and she made a satisfactory recovery up to a certain point. She has not, however, done well in the last two weeks, having frequent pain and an occasional temperature of 101° and 102°, without apparent cause. Dr. Rodman questions whether he did not make a mistake in not doing a pylorectomy instead of a posterior gastroenterostomy, and thinks it probable that the former operation will yet have to be done. In his opinion, the case shows that gastroenterostomy, while a most valuable operation, is not a "king cure-all," as supposed by some operators.

PLASTIC RESECTION OF THE MAMMARY GLANDS FOR BENIGN GROWTHS

DR. RODMAN also exhibited two patients upon whom he had operated by the method described by Professor Warren in his oration on surgery at Portland in 1905. Charts were exhibited showing the line of incision. The operation is applicable only in benign growths. It avoids all deformity, and only when the breast is pressed up exposing the scar is it possible to tell that operation has been done. The patients exhibited had been operated upon about three weeks ago.

A CRITICAL STUDY OF GASTROPTOSIS, WITH SPECIAL REFERENCE TO OUTLINING THE STOMACH, ILLUSTRATED WITH LANTERN SLIDES

DR. CHARLES B. WORDEN read this paper, describing his method of outlining the stomach by the use of bismuth emulsion, and his results in operations done from the diagnoses so made. Valuable lantern slides of cases were shown.

DR. HENRY K. PANCOAST exhibited some X-ray pictures of similar cases, and described the technique in the taking of X-ray pictures of the stomach and intestines.

DR. JOSEPH SAILER believed that the bismuth solution with the X-ray, in certain cases, was of paramount importance in determining the exact position of the stomach. He also warned against the possible toxic symptoms produced by the bismuth being allowed to remain in the stomach, and advised that it be washed out. In one or two cases of excessive acidity of the gastric contents, the presence of the bismuth had for a time given relief to the patients.

DR. JOHN H. MÜSSER indorsed the opinions of the value of the procedure, but believed it only fair to say that in his experience the results of such examination had been confirmatory, almost always, of what had been thought to be present beforehand. This, however, did not lessen the value of the work, for he feels that the most exhaustive procedures should be employed to determine the conditions present. Information regarding the transverse colon, he felt, could be secured by this me hod, obtainable in no other way.

DR. J. DUTTON STEELE believed the method of much value, as demonstrated by the beautiful plates exhibited. The old method of inflation, he thought, would still show itself to be of some value. He referred to the obscurity of the necessary factor in the production of symptoms in gastroptosis, and hoped that the method outlined by Dr. Worden might aid in the study of the more obscure conditions of the musculature of the stomach.

IS NEURALGIA A FUNCTIONAL DISEASE? A STUDY BASED UPON THE PATHOLOGICAL FINDINGS OF EIGHT CASES

DR. ALFRED GORDON, after an examination of the pathological specimens of eight cases of neuralgia, gives the following conclusions:

1. The occurrence of degeneration of the peripheral nerves is frequent, if not constant, in neuralgia.

2. This nerve degeneration is very probably a primary condition, which, as a neuritis, assumes an ascending course, and involves secondarily the Gasserian ganglion. Although this contention is still debatable, there is great probability in favor of the above view.

3. The blood-vessels undoubtedly play a certain *rôle* in the causation of a degenerative state of the peripheral nerve.

4. It is difficult, if not impossible, to draw a sharp distinction between neuritis and neuralgia, as cumulative facts show an anatomical basis in the latter affection.

5. In view of these anatomical facts, it is highly important to remove surgic lly a nerve affected with so-called neuralgia as early as possible after a short trial of medical treatment.

DR. CHARLES K. MILLS, for pathological, clinical, and surgical reasons, held the view that tic douloureux is primarily a disease of the Gasserian ganglion. The manner in which the disease originates and extends, the fact that it passes from one nerve branch to another, and that relief is afforded by a central operation rather than by one or more peripheral operations, are, in his opinion, arguments in favor of the Gasserian ganglion origin of the disease. The disease has seemed to him one of instability and degeneration, rather than a true inflammation. He does not believe that the degeneration of the nerves found in these cases is of the same character as that present in a true neuritis, which has for its signs tenderness on pressure and the other well-known signs. He admits that there is much to be said in favor of the probable peripheral origin of the disease in some cases, and believes that Dr. Gordon has well stated this view.

DR. WILLIAM G. SPILLER thought it made little difference whether the disease was in the nerve or in the ganglion, since there could not be injury of either portion without injury of the whole. The absence of pain following operation was not necessarily a proof that the ganglion was not diseased, for operation so injures the nerve-cells that for some time the nerve is incapable of producing pain.

DR. GORDON, in closing, said that his examination of cases led him to the belief that after a

brief trial of internal medication it was desirable and urgent to remove promptly the affected peripheral nerve.

1. UPON THE RESULTS OF CEREBRAL DECOMPRESSION; 2. NERVE-STRETCHING FOR THE TREATMENT OF ERYTHROMELALGIA

DR. WILLIAM G. SPILLER and DR. CHARLES H. FRAZIER presented papers upon these topics.

1. *Upon the Results of Cerebral Decompression*

DR. SPILLER said that the subject of palliative operation for brain tumor had been under discussion for many years. In some instances the tumor had grown through the opening in the skull, and much relief from pressure had been afforded in this way, as in Jolly's case, reported in 1899. He referred to the difference of opinion regarding the advisability of the decompressive trephining of Jaboulay; some authors favoring the mere opening of the skull; others regarding the opening of the dura also as necessary; still others speak of either procedure as dangerous. In 1903, Dr. Spiller had referred a patient to Dr. Frazier, requesting him to open the skull and dura for the relief of intracranial pressure. As he was unable to locate the tumor, he regarded it as probably present in the brain. The operation was performed November 3, 1903, and on April 4, 1904, a similar operation was done on the opposite side of the skull. The man has been relieved of his severe symptoms more than a year, and, although blind, is in a much better condition than he was before the operations were performed.

DR. FRAZIER, in speaking of the indications and technique for cerebral decompression, called attention to the fact that a very small percentage (from 4 per cent to 17 per cent), according to various estimates, of brain tumors were operable; therefore in the great majority of cases of brain tumor, only a palliative operation need be considered. Such is the operation known as "cerebral decompression." This operation is performed to relieve a certain group of symptoms characteristic of brain tumors, vomiting, headache, and choked disk.

Dr. Frazier laid special stress upon the unjustifiability of postponing operation after the diagnosis of brain tumor has been established. He cautioned the general practitioner against the practice of resorting to the mixed treatment for months, because of slight improvement, which improvement is noted quite as often when the lesion is a malignant tumor as when a gumma. Operation should not be delayed for want of accurate localization, since, in many instances, localizing symptoms never appear. Lastly, and above all, there should be no delay, once the signs of choked disk make their appearance.

Two points in the technique, he said, were of special importance: 1. The selection of the site of operation; 2. Management of the dura. As far as cerebellar lesions were concerned, the operation should be performed, in every instance, in the suboccipital region. In lesions of the cerebrum, the operator should be guided by the circumstances of the case. Under certain cases there could be no choice, as in cases in which, during the performance of exploratory operation, the brain so bulged that it was practically impossible to replace the flap without removing the bone, so that, no matter where the field of operation may be, a permanent bony opening must be established at that point. When, however, choice is possible, he would select a silent area of the brain, and for this reason preference should be given to the right temporal region. He spoke positively about the management of the dura. He is quite sure that it is not only unnecessary, but adds materially to the danger of the operation, to leave a permanent opening in the dura by making radiating incisions. The danger and possibility of the subsequent fungus cerebri are not to be lightly considered. That the dura may yield to the continued pressure of an actively growing tumor or internal hydrocephalus, once the overlying bone is removed, is well illustrated by the patient upon whom he had performed an occipital craniectomy. A photograph was exhibited, showing a very large hernia cerebri which developed at the site of operation. The results from this operation, obtained at the University Hospital, had been most gratifying. Dr. Frazier referred to a number of cases and exhibited two; one in which a bilateral craniectomy was performed over two years ago, and the relief had been absolute and permanent; another, in which a unilateral suboccipital craniectomy was performed two years ago, at which time one third of the cerebellar hemisphere was removed, the tumor not having been found. The patient, at the time of the operation, had marked bilateral choked disk, frightful headaches, persistent vomiting, and marked ataxia. The effects of the operation were immediate and striking. The patient's vision has been completely restored in one eye, and almost so in the other. His subjective symptoms have entirely disappeared, and his health has been restored to such a degree that he is now a railroad employee.

2. *Erythromelalgia: Its Pathology and Treatment*

DR. SPILLER said that since Dr. S. Weir Mitchell and he had reported in 1899 a case of erythro-

melalgia with microscopical study of an amputated big toe, several important contributions had been made to the pathology of this disorder. They had called attention both to the disease of the terminal ends of the nerves and to the intense sclerosis of the blood-vessels. Since the publication of this paper, Sachs and Wiener had reported the findings in an amputated limb, and although they had observed degenerative changes in the nerves, they had concluded that erythromelalgia is far more a vascular disease than one of the nerves. Examination of the terminal nerves in the foot, in their case, was impossible, on account of gangrene. Hamilton found much change in the nerves of the foot, but he also concluded that the disease is more a vascular disorder, although he did not ignore the nerve degeneration. H. Batty Shaw reports the findings in three cases of erythromelalgia, and in all three the nerves were normal. In two cases the material was hardened in alcohol, which is a most unfavorable hardening agent for the study of nerves.

Dr. Spiller had had a typical case of erythromelalgia. A study of the amputated big toe revealed distinct overgrowth of connective tissue within the terminal nerve branches and degeneration of nerve fibers in teased preparations stained in the fresh state with osmic acid. The walls of the vessels were greatly thickened. These findings are like those published in 1899. Nerve-stretching had entirely relieved the patient, without causing objective sensory changes. This could hardly be possible if the disease were a purely vascular one. In Dr. Spiller's opinion, erythromelalgia is both a disease of vessels and of nerve terminal branches. He had observed intense sclerosis of the vessels of the foot when the nerves were normal, without any symptoms of erythromelalgia.

Dr. Charles H. Frazier, in his paper upon this subject, said that the operation which they recommended and practiced for the treatment of erythromelalgia is the stretching of the cutaneous nerves supplying the affected region. There is very little to be said about the technique of the operation. The idea of applying the operation to the treatment of cases of erythromelalgia, Dr. Frazier said, was suggested by the work of certain French surgeons, more particularly Chipault, who, in a very interesting monograph, has reported his results, both experimental and clinical, upon the effect of nerve-stretching upon certain lesions, especially chronic leg ulcers and trophic ulcers, including malperforant. The results which he obtained were so striking that Dr. Frazier decided to apply it to the case of erythromelalgia, referred to by Dr. Spiller. The operation was performed only after the toe had been amputated. The flaps had become gangrenous, and there was no attempt at union. After the nerves were stretched, the pain entirely disappeared, and the tissues at once began to regenerate themselves until the wound in the stump was entirely repaired.

A second and equally gratifying case come under Dr. Frazier's observation in the person of a man, aged 60, who presented many of the characteristic features of erythromelalgia, including the pain and discoloration of the skin when the limb was in the dependent posture. The pain was so intense that the patient was kept awake at night. There was, in addition to the pain, an ulcer about the size of a silver dollar on the dorsal aspect of the foot. Dr. Havens, the surgical interne at the hospital, was instructed to stretch the cutaneous nerve supplying the area in which the ulcer was seated, and to which pain was referred. Two and a half months have elapsed since the operation was performed. The patient is entirely free from pain, and in the place of the sluggish excavating ulcer there remains but a small healthy granulating surface, which is rapidly being covered with epithelium. The discoloration, so conspicuous before the operation, has disappeared.

Dr. Alfred Gordon referred to the case of a boy of nine years presenting all the symptoms of cerebral tumor which Dr. Keen had asked him to treat. The tumor had been localized by Dr. Keen, but operation postponed. Under medical treatment, the headaches gradually disappeared, and at the end of several months the vomiting had ceased completely, and for the last three and a half years the patient has not had a single attack of either, and although at one time he was completely paralyzed, he is at the present time perfectly well, except that he is blind, which, however, is not complete. It was not Dr. Gordon's thought to minimize the splendid results obtained by Drs. Spiller and Frazier by surgical procedure, but simply to record this case, in which medical treatment was of value.

Dr. Charles K. Mills believes that almost every case of brain tumor should be operated upon. He would place the percentage of operable cases rather higher than four per cent; much higher, if partial relief as well as cure is included, probably not more than from four to six per cent of what might be called cured. Dr. Mills's own view in reference to the dura is in favor of letting it alone, or if there is a large opening, closing it in the usual way after operation. If the growth cannot be located, he would advise operation over the right temporal lobe as a palliative procedure.

NEW YORK OBSTETRICAL SOCIETY

WILLIAM S. STONE, M. D., EDITOR

Stated meeting, held March 13, 1906.

The President, DR. LE ROY BROUN, in the chair.

THE PATHOGENESIS AND TREATMENT OF PUERPERAL SEPSIS

DR. J. D. VOORHEES read a paper entitled "The Ætiology of Puerperal Sepsis." After referring to the original work of Holmes and that of Semmelweis, by which the mortality in the Vienna Maternity was reduced from 11.4 per cent to 1.2 per cent, he gave the mortality from sepsis in the Sloane Maternity Hospital from September 26, 1893, to January 14, 1905, as 0.25 per cent. This same series of cases gave a morbidity of 9.1 per cent. In private practice, however, the mortality rate has been little diminished since the introduction of Listerian methods, due, quoting Norris, to: 1. The carelessness and ignorance of the midwife who attends more than 60 per cent of women in confinement in the larger cities; 2. The uncleanliness of the rank and file of the profession. 3. The fact that the earliest symptoms of infection are disregarded and not properly treated. As nature's means of protecting the organism, the author mentioned the physiological increase in the metabolism during pregnancy, with the accompanying increment in the capacity for assimilation and excretion, the mucous plug in the cervix, the intact bag of water, flushing the genitals during labor, from above downwards, by a fluid, in some degree bactericidal, and finally, a firmly contracted uterus.

Of the germs causing the disease, the author first mentioned the streptococcus as the most frequent and fatal, being present in all but four of the fatal cases from sepsis, in which bacteriological examinations were made, out of 13,000 deliveries at Sloane.

Despite its frequency, however, the results of different observers showed that other bacteria must be held accountable — as the staphylococcus, sometimes proving fatal — the colon bacillus, with poor resistance on the part of the patient and associated with streptococci or other germs, often inciting a severe form. The gonococcees, although usually causing a mild form, may occasionally prove fatal, as in a case recently observed at the Sloane.

Of other bacteria, less frequently observed as a cause of puerperal infection, were mentioned, the Klebs-Loeffler-bacillus, the pneumococcus, the bacillus aërogenes capsulatus, and various anaërobic saprophytes, which find favorable soil for their development in bits of placenta and membranes or in parts necrosed by pressure, or in retained lochia and sloughing fibroids.

Conditions which predispose to the growth of pathogenic germs in the genital tract were given as follows: A dry labor, a protracted labor, operative labor, frequent vaginal examinations, the retention of gestation products, abrasions, hemorrhage, and a soft flabby uterus. Bacteria can gain entrance to the genital canal either before, during, or after labor, almost always by the hands of the accoucheur, midwife, or nurse, or by dirty instruments. The question of autoinfection was then discussed, a review being given of the bacteriological results of different observers, for which the author's conclusions were, that the normal secretions of the healthy genital tract are sterile, but that many genital tracts are not healthy, and contain bacteria, which occasionally are the cause of even severe and fatal forms of puerperal sepsis when every possible precaution has been taken by the attendants.

A source of infection that he considered may be autogenetic is the transference, through the blood to the genital tract, of bacteria from a focus in some other part of the body that may be present coincident with labor and the puerperium.

Under the title of "The Pathology of Puerperal Infection," DR. F. A. DORMAN first gave a general description of the different ways in which the infection spreads, most often primarily from the placental site by extension through the lymphatics, veins, or by continuity of mucous membrane, probably as to frequency in the order named. An analysis was then given of the autopsies in thirty cases of death from sepsis at the Sloane Maternity Hospital. Of these thirty cases, twenty-one showed evidences of suppurative endometritis. The remainder, in which infection of the endometrium could not be demonstrated, were all examples of general peritonitis, as follows: 1. Eclampsia, with death on the third day from general peritonitis, following rupture of the uterus. 2. Death on the fourth day; general peritonitis, following infection of a dermoid cyst of ovary, incised during labor per vaginam. 3. Eclampsia; death on the third day, from general peritonitis. 4. Death on the seventh day; general peritonitis, purulent pericarditis, empyema. 5. Death on the third day, from general peritonitis, following rupture of double

uterus after a high forceps operation. 6. Death on the fifth day, from general peritonitis. 7. Death on the nineteenth day, from general peritonitis, complicated by infective necrosis of liver, bronchopneumonia and pleurisy. 8. Death on the tenth day, from general peritonitis, following a ruptured tubo-ovarian abscess. 9. Death on the sixth day, from general peritonitis. This list showed four cases with unexplained rapidly developing fatal peritonitis, presenting no gross uterine changes. In the twenty-one cases of purulent endometritis the average day of death was the fourteenth. Complications were: General peritonitis, 9; suppurative metritis, 7; infarcts of kidneys, 6; suppuration of the broad ligaments, 5; phlebitis of the pelvic veins, 5; infarcts of the spleen, 4; infarcts of the lungs, 3; bronchopneumonia, 3; empyema, 3. The pelvic lymph-channels showed purulent inflammation in two cases. There were 4 cases of tubo-ovarian infection, 2 of infarcts of the liver, 2 of malignant endocarditis, 1 case of infarcts of the heart muscle; 8, or nearly 40 per cent, of these cases of endometritis were pyæmic, and over 43 per cent were complicated by general peritonitis. An analysis of the cases of peritonitis gave a total of eighteen, of which five were due to direct infection at delivery from peritoneal injury. Only fifty per cent of these cases gave gross evidence of intrauterine infection. Abscesses in the uterine tissue were present in 23 per cent of the cases, and there were two examples of gangrene of the uterine muscle. Ovarian and tubal complications were less frequent; in two cases the ovaries and tubes being matted together. As for conditions in other parts of the body, the kidneys showed the most constant changes. Abscesses or infarcts were present in 23 per cent; in one case the infection probably being an ascending one from a bladder infected after symphyseotomy.

TREATMENT OF PUERPERAL INFECTION

Dr. E. B. Cragin detailed the treatment as carried out in his service at the Sloane Maternity Hospital, and as he advised it to be done in private practice, as follows:

The Prophylactic. 1. As concerns the patient. Based upon the opinion that the vagina does not normally contain pathogenic organisms, he believes antepartum douches both unnecessary and harmful, from lessening the power of the tissues and from increasing the danger of introducing infection from without, except there is evidence of a gonorrhœal infection of the cervix and vagina, or there is a sinus discharging its contents into the vaginal canal. In such cases he advises bichloride (1-5000) vaginal douches once or twice a day during the last week of pregnancy, followed by a lysol douche (½ per cent) as labor begins, thereby not only lessening the risk to the eyes of the baby, but also adding to the safety of the mother even if it does not eradicate the disease. The last ten thousand cases at the Sloane without antepartum douches compare favorably with the period where they were used. The preparation of the vulva is made by clipping or shaving the hair with a safety razor, gentle cleansing with green soap and sterile water, followed by the use of alcohol, bichloride and lysol. 2. As concerns the obstetrician, he considers the use of rubber gloves, especially in private practice, as the greatest safe guard against infection, although no less care should be taken in the disinfection of the hands.

Treatment of Injection when Present. A brief description, with temperature-charts, was first given of conditions of other organs that may simulate infection of the parturient canal, such as appendicitis, pyelitis, from a colon infection of a compressed and dilated ureter, 16 out of 23 cases under his care occurring during the puerperium; milk fever, from distended breasts; a reactionary temperature following a long and difficult labor.

The infection of the parturient canal is divided into:

1. Toxæmia, due either to the absorption of the products of putrefactive bacteria, or to the toxins of distinctly pathogenic bacteria.

2. Bacteriæmia, or septicæmia, in which bacteria circulate in the blood. Only with toxæmia does he consider that the patients are greatly benefited by treatment of the interior of the uterus, except in those cases of bacteriæmia in which a superficial necrosis forms a pseudomembrane that nature has some difficulty in casting out of the uterus. An infrequent gentle intrauterine douche in the course of a long bacteriæmia prevents any accumulation in the uterus, and often lowers the temperature and hastens convalescence. Toxæmia being the most common form of puerperal infection, he believes the best rule is to consider every case a toxæmia until you have evidence to the contrary. In other words, make sure that the uterus is free from decomposing organic material in the shape of blood-clots, pieces of placenta or membranes, retained lochia, before deciding that a bacteriæmia exists. Recognizing that the uterine wall has certain natural protective power against the invasion of the general circulation with bacteria or their toxins, the author calls attention to the importance of not lowering its vitality by unnecessary manipulation or operations, the dangers of which are shown by the frequency that an increase of temperature, or perhaps a rigor, occurs

even after an intrauterine douche. As a means for emptying the uterus he advises first an intrauterine douche of salt solution given under the strictest aseptic conditions. If the douche brings away *débris*, but does not lower the temperature after one or two repetitions, it is the author's custom to make an intrauterine exploration under anæsthesia, using the finger so far as possible, and supplementing it by the curette only when the finger is incapable of doing the work. Douches are repeated and continued so long as *débris* continues to come away. Attention was also called to the cases in which a rise of temperature occurs, perhaps late in the second week, due to retention of lochia from either an anterior or posterior flexion.

In the treatment of the cases of general septicæmia, when once it has been determined that the uterus is free from decomposing organic material, its interior should not be invaded again, unless to ascertain at infrequent intervals by a gentle intrauterine douche that there is no retention of a pseudomembrane that may be separated from the wall. He would rely chiefly on medication and food that tends to maintain or increase the strength of the patient. Of drugs, alcohol and strychnine have given him the best service, and such medicines as aid the contraction of the uterus, for which the ice-bag has also seemed to be of value. Unguentum Credé has seemed to increase the resistance of the patient in many of the cases; but in others has been of no apparent benefit. He considers that the experience of others with collargyrol corresponds closely with his experience with unguentum Credé. Saline enemata, he thinks, are of distinct value. With the antistreptococcus serum he has been disappointed. Radical surgical measures he would limit to the few cases, occurring usually rather late in the disease in which the infection has largely localized itself in the uterine wall. In other words, he would recommend in surgical treatment of puerperal infection the selection of those operations which will rid the patient of her immediate danger with the least amount of shock.

DISCUSSION

Dr. George Tucker Harrison stated that he considered the doctrine of autogenesis as a dangerous one to teach, although he was prepared to admit that some cases occasionally do occur. He does not think that gonorrhœal infection should be classed as an autoinfection. Gonorrhœa, occurring as it does usually late in the puerperium, has symptoms, he thinks, that differ from those of toxæmia or infection, and that are usually mild and free from danger in comparison with the streptococcus infection. From a medicological standpoint, he thinks cases of autoinfection occur often enough to protect the physician. In regard to treatment, he wished to protest against the use of the curette, because, even if skillfully used, it is a source of danger; and with regard to intrauterine douches, he had never seen a case cured by their use, and there is always danger of breaking down nature's wall of granulation tissue. Dr. Tucker thinks that in the severe forms of infection collargyrol is of great value, as he felt that he had saved cases by its use that could not have been saved in any other way. He also referred to the posterior section of the vagina and the use of iodoform gauze as carried out by Dr. Pryor. He thought that the splendid results obtained by Pryor should receive more attention. He did not think Dr. Pryor's explanation of the results were correct, that the bactericidal properties of the iodoform gauze were due to the liberation of free iodine. Recent investigations have shown that in the decomposition diodacetylide was produced, which also had bactericidal properties.

Dr. William S. Stone said that he regarded Dr. Voorhees's statement regarding autoinfection as the most important point brought out in the papers, although Dr. Voorhees thought there was danger in teaching that infection ever occurred, except from the introduction of bacteria by the attendants. He pointed out that laboratory researches confirmed our clinical experiences that autoinfection does occur, streptococci in some cases being present in the vagina, that are indistinguishable from those known to be pathogenic. There is no doubt that the natural resistance of the tissues varies, but it is probable that more careful preparation and supervision of the patients during pregnancy may avoid some of the accidents that are now unexplainable. He regarded the pathological findings as furnishing an accurate guide to the classification of the general infections, as follows: Acute septicæmia or acute bacteriæmial pyæmia or chronic bacteriæmia, and acute general peritonitis. Some cases of the last variety, he thought, might be treated surgically, if seen by the consultant early enough to appreciate the local signs of pain and tenderness with other symptoms indicative of beginning peritonitis. He referred to the anatomical study recently made in Leopold's clinic, by which it was demonstrated that the lymphatics were present, even in the decidua. He deprecated the use of chemicals in intrauterine douches, and related a case in which general poisoning from their use had been mistaken for puerperal infection.

Dr. C. A. Von Ramdohr first spoke of the

irregularity of the temperature curves of cases of puerperal infection. He thought the term "auto-infection" could not be excluded, but that it very rarely occurs. He would not classify swollen breasts as examples of infection unless a temperature was present, in which case it was due to infection of an abrasion of the nipple. In cases of sapræmia, he thought an intrauterine douche would occasionally thoroughly wash out the putrid material, but usually it was better to use the finger or curette. In the general infections he advocated the use of large quantities of alcohol.

Dr. Herman J Boldt first called attention to the differences in the clinical courses, depending upon the difference in the virulence of the micro-organism. In this way only can we account for the recovery of some cases that are apparently hopeless. As an illustration of surgical treatment, he presented the uterus he had removed from a patient five days after the uterus had been thoroughly cleaned for a high temperature without benefit. Improvement had followed this procedure, although she was not yet out of danger. Dr. Boldt reiterated the statement he had made at a previous meeting, that no positive *data* could be obtained from the blood examination. He stated that he had not had the fortunate results with the Pryor treatment that had been reported by others. On the whole, he thought the treatment must be guided by the clinical symptoms. In acute bacteriæmia nothing could save the patient. He had been able to save one case of acute diffuse purulent peritonitis following an abortion, by an abdominal hysterectomy and washing out the abdomen a few hours after the pelvis had been packed with iodoform gauze through an incision in the posterior fornix without beneficial result.

Dr. George L. Broadhead, as illustrating the low mortality in hospital work, said that in the service of the Post-Graduate Hospital, which was largely in the tenements, there had been only three deaths in the last three thousand cases. While believing that cases of autoinfection do occur, he thought the vast majority of cases were due to the carelessness of the attendants. He thinks it would be wrong to advocate the general use of the antepartum douche, for fear of introducing septic material He considers it desirable, in private practice, to clip the hair of the vulva, and for cleansing the external genitals he relies upon acetic acid and chloride of lime. Rubber gloves should always be worn. He thinks a temperature may occur from breasts that are simply distended, especially in nervous patients. With regard to prophylaxis, he believes with Edgar that the mere retention of membranes is no indication for entering the uterus, unless there are symptoms of sepsis present. In bacteriæmia he has relied chiefly upon the use of alcohol and strychnine. He has used unguentum Credé with varying results. He had always advised against curettage in cases of phlebitis, and would ask Dr. Cragin for his opinion.

Dr. J Clifton Edgar, while accepting the conclusions of the laboratory in regard to the bactericidal powers of the vagina secretion, had never applied them clinically, as the antepartum douche had never been abandoned during his fifteen years' service at Bellevue Hospital. He had found that the clipping of the hairs around the external genitals was better than shaving, because the little cuts made by the razor offered ready foci for the introduction of infection. He thinks constipation is a more frequent cause of non-septic fever than irritation from the breasts. He does not consider that bacteriological examinations have been of much value in diagnosis. In regard to the frequency of puerperal infection in New York, he quoted the statistics of the first year's work of the Manhattan Maternity Hospital. Of 171 outdoor cases, there was a morbidity of only 2 per cent and no mortality, in contrast to a morbidity of 17 per cent out of 187 cases in the indoor service, with three deaths, which is kept almost exclusively for emergency cases that are sent in by outside physicians and midwives.

Dr. Robert A. Murray spoke of the danger of removing epithelium in scrubbing the mucous membrane, and in giving full doses of ergot to prevent subinvolution, which he regarded as the greatest cause of sepsis. In prolonged labor he advises the use of sterilized oil as a lubricant to prevent abrasions and absorption of toxic products. He also referred to the necessity of carefully instructing nurses to be careful in washing the vulva, and not to begin in the anal region.

Dr. George M. Boyd of Philadelphia (guest) said he regarded the term "autoinfection" as a bad one, many cases being the rekindling of a latent poison. The only true autoinfection is probably from intestinal poisoning, so that we should teach that the poison comes from without, although there might be some difficulty in explaining a few cases that have been delivered under aseptic conditions. He agrees with Dr. Edgar in regard to the use of the antepartum douche. During the past sixteen years it has been used as a routine in the service of the Lying-in Charity of Philadelphia, with excellent results. He has always used bichloride as a douche in delivery without any deleterious results. He would advise against the use of the curette. In regard to the graver

surgical measures, he had always thought it was a mistake to consider them early in the puerperium, but that later the results were satisfactory in some cases, so that undoubtedly hysterectomy had a limited field of usefulness in puerperal sepsis.

Dr. Malcomb McLean stated that his experience had taught him to abandon absolutely the use of the curette, substituting a smooth forceps, as he was unable to remove always all of the retained products with his fingers. He had likewise substituted for the intrauterine douche in nearly all cases a cotton swab soaked with the strongest tincture of iodine.

Dr. James D. Voorhees, in closing, said that he had expected to stand alone in regard to the possible occurrence of autoinfection. He thinks that gonorrhœa should be regarded as an autoinfection. He said that he had tried to bring out that different varieties of bacteria with different grades of virulence must be present to account for the varying severity of the cases. Some streptococci not being virulent, some having lost heir virulence and become saprophytic, others having lost part of their virulence, may, under favorable conditions, be capable of regaining their original virulence, while others, living in a saprophytic state, may ascend into the uterus after labor and cause a puerperal infection. He thought in emergency cases an anterpartum douche may be beneficial.

Dr. Edwin B. Cragin agreed with the opinion held against the curette, if a sharp instrument was meant, but that he referred to a dull instrument, such as one blade of a looped sponge-holder, which would aid the finger with the least amount of harm in cleaning out the uterus. He had used Dr. Pryor's method of treatment in early pregnancy cases, but in the full-term cases he thought it opened up too many avenues of infection. In cases of phlebitis, he would not use the curette, lest new channels of infection should be opened. As to the ætiology of phlebitis, he related the history of a case which on the twenty-first day had a slight rise of temperature and developed a phlebitis. The day following, a piece of foul membrane was passed, which he regarded as the cause of the phlebitis. He agreed with Dr. Edgar concerning the condition of the bowels as a frequent cause of rises of temperature. He thought that the mere movement of the bowels, with its accompanying straining, often compresses the uterus enough to empty it of its contents.

ABSTRACTS OF CURRENT LITERATURE

DEPARTMENT OF SURGERY

UNDER THE CHARGE OF

JOHN B. MURPHY, M. D. — E. WYLLYS ANDREWS, M. D.
FREDERIC A. BESLEY, M. D. — WM. R. CUBBINS, M. D.

LUNG COMPLICATIONS AFTER ABDOMINAL OPERATIONS. By E. Bebergeil.

The author has reviewed the cases at the Urban Hospital in Berlin during fifteen years — from 1890 to 1905 — 3,909 abdominal operations. Of these, 283, or 7.2 per cent, of the cases had pulmonary complications; 9.8 per cent were operations above the umbilicus and 6.6 per cent were operations below the umbilicus. This showing, the author thinks, is due to the proximity of the diaphragmatic region, so that the lung is not freely filled or emptied, on account of the pain in respiration. This, with the fact that there is always some mucus aspirated during the anæsthetic, enables the infection of the bronchioles to take place, and as bronchopneumonia is by far the most common pulmonary complication, the author sees a direct connection between the two.

Whether the wound was infected or not had no bearing on the pulmonary complications; complications appeared evenly in both clean and septic wounds.

Of the organs operated upon, the complications seemed to be much more frequent after operations on the stomach; those next in frequency were of the gall-bladder and of the bile-ducts.

The author could see no difference in the anæsthetic used, as sometimes complications resulted after local anæsthesia.—*Archiv für Klin. Chir.*, bd. lxxviii.

HYPERTROPHY OF THE SUPRARENAL CAPSULES FOLLOWING THE REMOVAL OF THE OVARIES. By W. Theodossiev.

Marchand recognized, in 1891, a case of "hermaphrodism feminin," in which the autopsy revealed an atrophy of the ovaries and also hypertrophy of the suprerenal capsules, with numerous supernumerary adrenals in the broad ligaments. In order to demonstrate this point, Theodossiev has undertaken at the Pathological Institute in Kazan a series of experimental researches.

The plan was to remove the ovaries of dogs and wait more or less time — ten months at the longest — to see the changes that occur in the suprarenal gland.

Proceeding in this manner, the author has proven to his own satisfaction that there is a close relation between the two glands. The suprarenals were always found markedly hypertrophied in all the animals that were castrated. This hypertrophy involved both the stroma and the parenchyma. Among the parenchymatous elements increased were those of the cortex, and especially those of the globular and fascicular zone. Thus the medullary and reticular zone undergo a certain reduction in volume. The hypertrophy began at the globular zone and spread to the middle.—*Russk. Vrach.*, February 4, 1906.

CONTRIBUTION TO THE STUDY OF GUNSHOT WOUNDS OF THE KIDNEY. By A. Kabloulsov.

Gunshot wounds of the kidney are rarely observed, owing to the position of the kidney in the posterior portion of the abdominal cavity, protected by the anterior abdominal walls, the posterior abdominal walls, and the spinal columns.

In the Russo-Japanese war, the author saw seven thousand gunshot wounds, in which only three were of the kidney. These wounds penetrated entirely through the body, from before backward, so that in all probability there was some wound of the bowel connected with it, and they all showed evidence of peritonitis, but it was not necessary to do a laparotomy in any of the three cases. The first few days after the wound was received there was a discharge of bloody urine from the posterior wound and also bloody urine in the urinary bladder, but the posterior sinus soon healed and the blood disappeared from the urine. In one case the infection was so severe and continued so long that it was necessary to do a nephrectomy, after which the patient recovered rapidly.—*Med. Obozr.*, lxvi.

Investigations upon Remote Results in Compound Fractures of the Skull.

F. Brewitt (Urban Hospital, Berlin), after careful inquiry into the status præsens of thirty cases of compound fractures treated at the hospital from four to eleven years ago, discusses results of immediate and secondary closure of bony defect of skull. In suitable cases, i. e., if cleansing of the wound and bone fragments was possible, immediate replacement of the fragments has been practised at that hospital for fifteen years. Old neglected or infected cases were excluded, likewise those with prolapse or profound and extensive destruction of brain substance and escape of cerebro-spinal fluid. The method has been employed, however, in suitable cases with increased tension in the dura, injuries of the dura in cases of injury of the middle meningeal artery, as well as in injuries of cerebral sinuses, if extensive soiling of the wound was not present or the dirt could be removed.

Technique. All fragments elevated or detached with instruments are cleansed with sterile sponges, particles of dirt closely impacted into the bone are pinched off, and all the bone fragments preserved in warm sterile salt solution. Fragments still connected with the periosteum are not detached, but reduced to their normal position. After toilet of dura by sponging with sterile salt solution and drying, fragments are replaced so as to touch each other and form a coherent layer. It is not necessary to fill defect to plane of sound bone; a thin layer suffices to serve as support for the new bone. If possibility of infection exists, a drain of iodoform gauze or rubber protective. If possible, the periosteum should be united over the fragments. Accurate approximation of soft parts is essential.

Twenty-eight of thirty-six implantations show perfect healing, with complete bony closure of defect. Four cases showed slight depression associated with a slight "give" of the implanted bone. Marked depression resulted in one case. Negative results occurred in one case — recurrence of depression. Sequestration occurred twice, but one piece of bone was affected in each case; the others remaining and uniting, producing complete closure of defect.

Secondary implantation was practised once, with negative results.

Osteoplasty (Müller-König) was done in four cases, with perfect result.

In order to draw conclusions as to final results of cases treated by implantation, and those treated by the open method, he compares the gravity of the injury in both series of cases.

PRIMARY IMPLANTATION

	Cases
Total unconsciousness	17
Diminished papillary reaction	
Difference of radial pulse	
Vomiting	

In six of these, injury to brain.

OPEN METHOD

Cerebral symptoms in 13. In 6 of these, meningeal symptoms; general condition very poor (these died).

SUMMARY OF FINAL RESULTS

	Cases
Implantation	38
Free from any complaint	24
(Two died of intercurrent diseases several years after injury.)	
Slight complaints	2
Complaints disabling patient for work	2
Died of severity of lesion	2
Unable to re-examine	8
(All these had left hospital, free from complaint.)	
Epilepsy	0
Secondary osteoplasty	4
Free of complaint	3
(One free from epileptic attacks at this time.)	
Marked complaints	1
Epilepsy	
Open method	30
Free from complaint	9
Slight comblaints	2
Totally disabled	1
Epilepsy	1
Died	8
Unable to re-examine	9
(Free from complaint when discharged; one with metal cover.)	

Brewitt arrives at conclusion contrary to Koeler, that primary closure of bony skull defects is to be attempted in suitable cases, as those treated in this manner show better results as to permanent recovery than those treated by the open method. Bunge and Strieda arrived at similar conclusions. — *Archiv f. Klin. Chirurgie*, vol. lxxix, pt. i, 1906. E. C. Riebel.

Rare Case of Enterocele. Resection of Intestine with Modification of Murphy Method.

Professor Antonelli reports a rare case of circumscribed adhesive peritonitis occurring between six loops of small intestine contained in the sac of an inguinal hernia. This led to symptoms of intestinal obstruction, necessitating resection of the

loops. In conjunction, the author describes a modification of enteroanastomosis with Murphy button as practised by him. He points out that, according to von Frey's investigations, a union of the muscular and mucous portions of the intestine in Murphy button anastomosis is the exception, as contact of the resected ends exists only between serous surfaces. Union occurs by a more or less extensive layer of artificial connective tissue. To overcome this, he devised the following: Circular incision through serosa and muscularis on each intestinal end, about 6–8 mm. from margin, formation of a cuff by removing serosa and muscularis. Each end of the Murphy button (button should be somewhat smaller than intestinal lumen) is now inserted into a corresponding cuff and the anastomosis finished in the usual manner. Subsequently, a careful circular suture is placed, uniting the musculoserous ends of the intestine. This may be succeeded by a seroserous suture if desired, but may be omitted if time presses. The following advantages are claimed for this modification:

1. Prevention of stenosis by perfect adaptation and union of the muscular layers.

2. Danger of penetration of fluid through suture line is lessened.

3. Button is detached within a few days.

Microscopical sections show that the union is an ideal one, especially in the longitudinal muscular fibers of the tunica muscularis, as well as those of the muscularis mucosæ. Line of incision hardly recognizable. Circular bundles are permeated by cicatricial tissue arising from subserous and submucous connective tissue interrupting the absolute continuity of the muscular bundles. These, however, are situated so close, and their course is so regular, that their functional activity seems assured.

He discusses the efforts made in procuring proper position of margins in intestinal resection, questioning the work of Chaput, Vella, Morisani, Pari. — *Archiv f. Klinische Chirurgie*, vol. lxxix, pt. i, 1906. E. C. RIEBEL.

CANCER OF THE STOMACH. By W. J. Mayo, Rochester, Minnesota.

The author opens his paper with a plea that all suspected carcinomata of the stomach be referred to the surgeon directly, as surgery is the only means that has ever furnished relief. He claims that the stomach is the most favorable of organs for the complete removal of any malignant growth, and the return is slow. The four sources of the blood-supply are easily pulled up and ligated, so that the operation is practically bloodless. By the use of clamps it is possible to stay away from the stomach cavity. Running sutures are used, and are particularly effective, besides saving time. Three different forms of operation have been used.

First, and most common, is the removal of the pylorus, with complete closure of the ends and a new opening for a gastrojejunostomy as elsewhere abstracted, 76 cases.

Second, Kocher's operation, used 15 times.

Third, Bilroth, 9 times.

After eliminating this number, all to 63 cases which are beyond question, we have —

14 operated too recently for value;
9 died in 6 months;
40 lived 6 to 12 months; 23 alive now;
25 lived 1 to 2 years; 17 alive now;
12 lived 2 to 3 years; 10 alive now;
5 lived 3 to 4 years; 4 alive now;
1 lived 5 years; alive now.

The statistics of Kocher, Krönlein, and Mickulicz are quoted, and show relatively the same favorable results; the better the technique, the better the results. The younger the patient, the sooner the recurrence, as the lymphatics are more active. The author finds that the work of Cuneo in demonstrating the lymphatic supply has been of great value, and that it is true in the practical application.

Diagnosis. Exploratory incision is the only way that the diagnosis of a gastric cancer can be established. A suspicion of cancer that cannot be disproved is an indication for a laparotomy.

The clinical history is the most important, and fifty per cent of the cases give a previous history of gastric ulcer, and the chemical and biologic tests are merely confirmatory.

Among the last 39 cases of resection for cancer of the stomach, fifty-six per cent were developing directly upon ulcer. For this reason no dependence is placed upon the post-mortem statistics, because, as a rule, the carcinoma has over-grown the entire picture.

The early mechanical obstruction is one of the best aids to an early operation, and a movable tumor also helps the patient to an early operation, and does not constitute a contraindication.

The contraindications are: 1. A large supraclavicular gland, usually on the left side; 2. Fixity of the growth; 3. Ascitic accumulations.

Palliative operations are not recommended unless they cannot be avoided.

—*The Journal of American Association.*

PEPTIC ULCER OF THE JEJUNUM AFTER GASTROENTEROSTOMY. By A. Gosset.

A. Gosset reports a case of perforating ulcer of the jejunum after a gastroenterostomy, and collects thirty other cases from the literature, in order to draw conclusions. It is only six years since it was recognized that the peptic ulcer of the jejunum may follow a gastroenterostomy for ulcer of the pylorus, and only sixteen years since the first gastrojejunostomy was done.

It occurs most commonly in men, and the age has very little effect. The kind of operation does not appear to have made any difference. In 27 cases where the method is described, we have:

15 follow gastroenterostomy by anticolic method;

4 follow gastroenterostomy by anticolic method with enteroanastomosis;

1 follows gastroenterostomy by Y method.

6 follow gastroenterostomy by retrocolic method;

1 follows gastroenterostomy retrocolic enteroanastomosis.

That most of the cases are in the anticolic method is due to the fact that that has been the most common method in Germany, where most of these cases have been recognized.

The ulcer in the jejunum may appear any time from ten days to seven years after the operation, and its anatomy is identical with the ulcer of the stomach. Most frequently it is single; in three cases it was multiple. It may be located on a level with the anastomosis, or 10–15 cm. below. It may also be either on the ascending or descending loop, although most commonly found on the descending loop.

The symptoms are divided into three groups:

1. Those who complain very little, and without any premonition have an attack of violent pain, vomiting, and collapse, due to perforation into the large cavity.

2. After an interval there are symptoms similar to those of gastric ulcer, accompanied frequently with infiltrations of the abdominal wall.

3. Same as those in 2, but with adhesions to and a perforation into some hollow viscus.

The diagnosis is difficult, unless one recognizes the possibility of a jejunal ulcer.

The prognosis varies as to time of onset, diagnosis, and the ability of the operator.

Pathogenesis. It is almost always observed in hyperacidity and almost always after benign disease, although there is one case of ulcer following carcinoma. But the author does not believe that hyperacidity is in itself enough to cause this ulceration, and that it is necessary to add two other causes: 1. A very marked stenosis; and 2. A great dilatation.

As most of the gastrojejunostomies are made well toward the pylorus in the type of case in which we have the three factors, and as the acidity of the gastric juice is most marked in that region, the author suggests that it would be better to make a gastroenterostomy much farther back on the great curvature and as high as possible on either the posterior or anterior surface so as to avoid the active gastric juices, or to resect the pylorus so that there the gastric juice should meet the neutralizing effects of the bile and pancreatic juice. Finney's pyloroplasty is not mentioned. — *Révue de Chirurgie,* January and February, 1906.

RECENT ADVANCES IN THE PHYSIOLOGY OF THE DIGESTIVE ORGANS BEARING ON MEDICINE AND SURGERY. By Walter B. Cannon.

There is a difference in the contents of the pylorus and cardia. The pylorus churns up the food, while in the cardia it is quiet and may continue its salivary digestion for at least two hours.

Gastric juice is stimulated to flow only by reflex conditions, such as beef-broth, water, or any palatable food. The merely mechanical act of chewing has little or no effect. Irritating substances, such as sand, etc., applied directly to the mucous membrane of the stomach, only provoke a discharge of alkaline mucus as a protection. The pyloric end of the stomach churns up the food thoroughly with the gastric juice and reduces the larger particles to the required size.

It has been determined that the pylorus exerts a selective ability in regard to what foods shall be allowed to pass. The carbohydrates, which are not much affected, pass soonest to the duodenum, and the proteids next, when there is free acid at the pylorus and no large particles. The fats are the last to enter the small intestine.

The food that passes into the small bowel starts the pancreatic secretion indirectly, because the mucosa of the small bowel puts into the blood a substance called "secretin," which differs from the ordinary enzyme, in that it is not affected by strong acids and resists boiling.

But this pancreatic juice contains no proteolytic ferment, as the trypsinogen is not active until it meets the succus entericus, which contains enteroekinase. This latter with the trypsinogen makes a very active trypsin.

The entry of bile into the intestine is controlled by the character of the food that enters the duodenum. Its flow is not stimulated at all by water

acids, raw egg a bumen, or boiled starch. But fat, meat extracts, or the products of digested egg albumen, are very active stimulants. The bile doubles the action of the pancreatic ferments and inhibits the action of the pepsin.

One man has found that extracts of the mucous membrane and of parasites inhabiting the small intestine check in "vitro" the proteolytic action of the pepsin and trypsin. If these are substantiated, it looks as if it will prove that the body protects itself against digestion by antiferments, and that the gastric and duodenal ulcus is due to a lack of this protection, and not to erosion.

This automatic control of the pyloric action, secretion of pancreatic juice which is in the duodenum, is only too likely to be lightly considered and set aside as any other portion of the small intestine, without considering the disturbances and readjustments that must occur.

The small intestine is a region of absorption as well as digestion, and as there is no sphincter to control the onflow, it is automatically stopped by rings of constriction at different lengths, the intermediate portion churned by alternate contractions and relaxations, so that the absorbing mucosa is forced into the finely divided food. The portions of the food ready to be assimilated by that section of the bowel are absorbed, and the rest forwarded to another location to undergo more churning and absorption.

These rhythmical churnings occur in the dog and cat about 18.30 times a minute; in the human, about 7 to the minute. Cathartics seem to inhibit this segmentation, so that the food is passed rapidly through by peristalsis without any churning. Antiperistalsis is the normal movement of the large intestine, and the ascending colon is the most active, the soft contents of the small bowel being churned up and down in the closed cæcum until all the fluids are absorbed. The iliocæcal valve holds for the contents of the cæcum when they are of moderate consistency, but admit salt solution. In lower animals the injection of thick, creamy fluid into the colon will be forced past the iliocæcal valve into the small intestines to be churned, just as if it came from the stomach.

As to whether different foods can stimulate a gland to put out a different ferment, there is as yet considerable controversy. But it is certain that to feed a dog milk sugar will cause the pancreas to put out lactase, which is normally absent. Dogs fed on starch soon acquire a saliva of considerable amydolitic power after a continued starch diet. — *American Journal of Medical Science*, April, 1906.

INTERMITTENT HYDROPS OF THE GALL-BLADDER BY OBLITERATION OF THE CYSTIC CANAL. By E. Villard and G. Cotte.

For a long while the similarity between this condition and hydrops of the kidney was not considered. But that the relationship as regards mechanism is exact cannot be doubted. It is a much more common condition than is generally supposed.

The causes are divided into the congenital and acquired.

1. Congenital.
a. Mesocyst.
b. Persistence of the duct-valve.
2. Acquired.
a. Stones and parasites.
b. Wall injuries; scars and neoplasms.
c Compressions or adhesions.
d. Faults in the position of the liver and ducts.

Of all these, the stones are far the most common They have the ball-valve action, so that bile is admitted freely and allowed to escape with difficulty, thus causing a distention. Injuries to the wall occur, and are to be considered.

The next most common cause is that of faulty placement of the liver or the ducts; in those due to either a hepoptosis or nephroptosis.

The contents of the gall-bladder may be a clear, thick mucus, or mucus more or less tinged with bile. The walls are more or less thickened according to the distention it has undergone.

Without a distention of the gall-bladder, the pain and tenderness are both located in the right hypochondrium. The pain is very severe, and radiates same as in hepatic colic. This dilatation continues until the obstruction to the ducts are overcome.

The tumor thus formed can be palpated in the right hypochondrium, in most cases. Sometimes, when there is a marked tenderness, it is necessary to give a hypodermic of morphine.

This dilatation continues until the obstruction is overcome and the pain relieved, a period varying from a few hours to two or three days. These attacks may come frequently, or be from months to years apart.

The clinical value of the intermittent hydrops of the gall-bladder is, that, when recognized, it gives a sure clew as to what changes may be expected; i. e., whether there is a complete or incomplete blocking of the cystic duct.

Treatment. Cholecystostomy is preferred, as being the most simple and the least dangerous.— *Révue de Chirurgie*. January and February, 1906

ABSTRACTS OF CURRENT LITERATURE

DEPARTMENT OF GYNECOLOGY

UNDER THE CHARGE OF

J. Clarence Webster, M. D. — E. C. Dudley, M. D.
John C. Hollister, M. D. — F. W. Lynch, M. D.

The Vaporization of the Uterus. By Karl Baisch.

The author calls attention to the comparatively small percentage of cases of uterine hemorrhage not due to carcinoma or myoma, that are cured by curettage, and quotes the unpublished cases of Grossman, also an assistant in Döderlein's clinic at Tübingen, in proof of the statement. Thus, of 136 cases with interstitial or glandular endometritis, but 45 per cent. were cured by this method of treatment. Consequently it is no wonder that observers have been seeking a substitute for curettage for use in the treatment of endometritis.

Although atmokausis, or vaporization of the uterus, is not an innocuous method of treatment, as was first supposed, the author believes it may be of the greatest service in selected cases. The deaths that have resulted occurred because the method was used in unsuitable cases, as has inflammation of the adnexa, phlegmasia, thrombosis, obliteration of the uterine cavity of young women, stenosis of the internal os and secondary hæmatometra, cyst formation in the uterus, and the other accidents that have been noted even in the hands of specialists. Yet many careful observers have found the method most useful in suitable cases.

The author presents drawings to show the histological result of the treatment. If a uterus that has been subjected to vaporization for 1½ minutes at a temperature of 108° be removed on the following day, the inner surface of the uterus will be found to be converted into a thick brown coating for a depth of one to three mm., under this will be a red layer of about the same thickness, resting upon the unchanged muscular tissue. The effect is as of a burn of the third degree. A number of such examinations has convinced the author that the thickness of the burned layer is not in direct proportion to the duration of exposure to the vapor, as it constantly is found from ½ to 3 mm. in thickness; consequently the old directions to obtain burns of various depth by exposure for various temperature, as 105°, 110°, or 115° for from one to three minutes, cannot be said to be substantiated by the anatomical findings. The results of the treatment are not to be judged by the depth of burn obtained, but by the histological changes produced in the glands, in turn dependent on the thickness of the mucosa. If the mucosa is thin and atrophic, as often is noted in the metritic affections at the time of the climacteric, it will be destroyed, and the resulting slough will leave the muscularis without a glandular covering. If, however, the endometrium is thickened and hypertrophied, only the surface will be affected and the tissues will soon regenerate.

The method is absolutely contraindicated in the young who preserve the functions of menstruation and the possibility of conception, save in the rare cases of hæmophilia, purpura hemorrhagica, leukæmia, etc. Its best indication is in treatment of the menorrhagias and metrorrhagias of the menopause, symptoms which are more frequently due to a metritis, an insufficiency of the connective tissue of the myometrium, arteriosclerosis, etc., than a hyperplasia of the endometrium. Such cases are frequently not relieved by curettage, and the condition may become so troublesome that total extirpation is frequently resorted to. Of similar cases in the Tübingen clinic between the ages of 40 and 50 years, only one third were cured by curettage, and one thi d were not at all improved.

The combination of vaporization and curettage gives good results in these cases. They can be done at one sitting, when anæsthesia will be necessary for vaporization on account of the pain, bu a week after curettage, vaporization may be done without pain. The value of the combination is illustrated by the drawings in the text. The base of the glands of the endometrium is not destroyed in the case treated by vaporization alone, consequently regeneration speedily will take place, while in the combined method of curettage and vaporization, only those glands lying in the muscularis resist the treatment.

This combined method of treatment has been

attempted in 15 of the author's cases between the ages of 40 and 50 years without bad results. In ten of these, the menopause was brought on by obliteration of the mucosa by the vaporization, a method less dangerous and far easier than total extirpation of the organs.

It was formerly thought that this method would be of value in stopping the bleeding from myomata, but the author believes it is contraindicated in this class of cases. A submucous tumor may not be destroyed by the method, and gangrene may rapidly be induced by destruction of the endometrium which covers the growth as has occurred in several reported cases. The author emphasizes the statement that all septic conditions not only of the adnexa, but of the uterus, must constitute a contraindication to vaporization. It was formerly believed that this method would prove ideal in the treatment of septic abortions, puerperal fever, gonorrhœa of the cervix and the uterus, as by it one could sterilize the uterine cavity. This is shown to be untrue, and even the reverse is true, and if the uterus were sterile before vaporization, the necrotic substance of the burn forms an admirable culture media for the organisms present in the lower birth-canal. In the case of infections, even if the surface of the endometrium were sterilized by the vapor, there would yet remain germs in the deeper layers to carry on the septic processes.

The chief indication for treatment, therefore, is of the simple uncomplicated cases of preclimacteric hemorrhage. — *Zentralblatt für Gynaekologie*, January 6, 1906. F. W Lynch.

The Operative Treatment of Puerperal Peritonitis and Pyæmias. By G. Leopold.

The author reports a series of eleven cases in which puerperal peritonitis was treated by laparotomy in the Dresden clinic. The series dates from 1899.

The cases are critically considered under the following heads: Acute general peritonitis, local circumscribed peritonitis, and pyæmia of the pelvic veins. There are five cases in the first group of acute generalized peritonitis. Of these, the gonococcus was the undoubted ætiological factor in the first case, apparently the cause of the peritonitis in the second case, possibly the cause in another case which presented a gonorrhœal salpingitis and ovaritis, although the diplococcus could not be obtained from the secretion. The fourth case followed a criminal abortion, and the fifth case delivery by forceps after dilatation of the os by a Bossi dilator, the obstruction to birth being a carcinoma which lay between the uterus and rectum. No record of bacteriological examination of the exudate in the abdominal cavity is given in these two cases. Three of the cases recovered, two died; both of the deaths occurring in cases probably of gonorrhœal origin, operated on the fourth and sixth days, respectively, of grave symptoms. The case of metrophlebitis purulenta puerperalis, discussed as the third group, and operated as a last resort on the sixteenth day of alarming symptoms, also resulted fatally. Coverslip preparations from abscesses about the tubes showed the streptococcus.

As a result of his study, Professor Leopold believes the three fatalities resulted because operation was too long delayed. He emphasizes the importance of prompt and early operation. When a case presents high fever, the pulse becomes smaller in tone and more rapid in rate, the abdomen is progressively more tender and distended, hiccough and vomiting appear, dullness can be percussed in the abdomen, extending well up into the hypochondria, and the skin and expression of the face show profound infection, a laparotomy can be productive only of good.

The time has then passed for treatment with ice and opium, antistreptococcus serum, and collargol injections. Free drainage and counter-drainage should be attempted, not only from the pouch of Douglass through the vagina, but in the hypochondriac regions as well. The author advocates not only the thorough rinsing of the abdominal viscera with normal saline at time of operation, but on succeeding days he also washes out the draining areas in he same manner, hoping to prevent secondary infection.

The five cases of circumscribed peritonitis all recovered following operation, performed between the nineteenth and forty-ninth days of the puerperium. Some of the cases presented suppurating adnexa as the focus, while three cases were found to have uterine abscesses. Leopold believes that the focus of inflammation should be removed whenever possible, although individual conditions must modify the method of procedure. Several operations may be necessary to discover and remove the primary focus, and one must bear in mind that the most complicated cases may be straightened out by careful technique. — *Archiv für Gynaekologie*, bd. lxxvii, h. 1.

F. W. Lynch.

Suprapubic Hysterectomy as a Means of Diagnosis and Treatment of the Uterus. By W. W. Russell.

The author reports a series of 32 cases in which this procedure was followed as a means of diag-

nosis or treatment by various members of the gynecological staff of the Johns Hopkins Hospital since it was introduced by him in 1897 in Dr. Kelly's clinic. He believes that the method is of conspicuous service in cases of persistent uterine hemorrhage, which cannot be controlled by less radical means of treatment, provided that bimanual examination of the pelvic organs has previously given a negative finding. In these cases he has frequently found, upon microscopical examination, a polypoid change in the endometrium which he believes may account for the hemorrhage. This condition of the endometrium is most constantly found in the neighborhood of the uterine cornua, and is not open to successful treatment by the ordinary method of curetting, because none of the instruments in usage at the present time will successfully reach the areas about the opening of the tubes. Other indications for this method of treatment are afforded by small submucous and pediculated myomata, which, although not large enough to affect the size or contour of the uterus, may yet be a source of dangerous hemorrhage. Dr. Russell frequently has used the procedure in cases in which the abdomen has been opened for some other purpose, and no explanation has been found for the uterine hemorrhage. No deaths occurred in the series.

The procedure is as follows: A uterus which is suspiciously enlarged, or which has given rise to intractable, unexplained hemorrhages, is exposed, either in the course of an abdominal operation for other purposes, or purely for the purpose of doing a hysterotomy. After the examination of the pelvic organs, the uterus is lifted up into the wound, walled off with gauze, and split in the median line on the anterior wall as well as the fundus, well into the uterine cavity, so that the cavity may be partially seen and completely palpated. In case curetting is necessary, it may be accomplished under the eye with the certainty of reaching all portions of the uterine cavity. The uterine incision is closed with interrupted catgut sutures. There was generally but slight bleeding, and it was not necessary to ligate a bleeding vessel in any instance.

The summary of the cases completed the report, the histories being given in abbreviated form. The results are given in terms of the operation (we wish it could have been stated in terms of relief of symptoms, and that the influence of the operation upon future pregnancy and labor might have been observed). — *Johns Hopkins Hospital Bulletin*, May, 1906.

F. W LYNCH.

ABSTRACTS OF CURRENT LITERATURE

DEPARTMENT OF OBSTETRICS

UNDER THE CHARGE OF

C. S. Bacon, M. D. Rudolph W. Holmes, M. D.
C. v. Bachellé, M. D.

Extramedian Symphysiotomy. A Symposium.

Hæbotomy. By Kannegiesser.

This paper is a report of 23 cases from the Dresden clinic, with histories, later results, and radiographs. The pelves were mostly rachitic, generally contracted and flat, conjugate vera from 7 cm. to 8.5 cm. Of the 23 children, 19 lived (82.61 per cent), and no mother was lost. The puerperia were normal, except in 7 cases. These complications were: One pyæmic abscess of the knee (gonorrhœal) with subsequent anchylosis, one hæmatoma of the labia majora, thrombosis of the veins of the legs, and four bladder injuries. Instead of introducing the finger behind the symphysis, Döderlein's instrument was used after a small skin incision over the pubic tubercle had been made with the knife. The bones healed so rapidly that the patients were up and about on their feet in the usual fourteen days. After the pelvic separation, done only when complete dilatation of the cervix had occurred, artificial (operative) delivery was at once effected. — "*Beitrag zur Hebotomie auf Grund von 21 Falle*," *Archiv f. Gyn.*, lxxviii, 1.

Method of Performing Pubiotomy. By W. Rosenfeld.

Every pelvis, as a result of the natural elasticity of the bones and of the mobility of the articulations, possesses a certain facility for enlargement (conjugate vera up to 6 mm.). This is increased by pubiotomy.

2. The difference between the enlargement by pubiotomy and that produced by symphysiotomy is insignificant, particularly in certain forms of pelves, for the reason that the two points of section of the os pubis are only about 1½ cm. apart.

3. The method of enlargement is not the same in the simple flat pelvis as in the justominor or generally contracted flat pelvis. In the first, the two oblique diameters are increased by the operation in the same manner as the conjugate vera; in the two latter varieties, the oblique diameter opposite to the section is most increased. Therefore the bisected side is wider than the other.

4. As a result, one should perform pubiotomy on that side through which the biparietal diameter of the fœtal head must pass.

5. The increase in the conjugate vera is for the most part at the expense of the sacroiliac articulation.

6. Hence the necessity for varying the technique according to the variety of the deformity.—"*Ueber die Art der Beckenerweiterung bei der Pubiotomie*," *Zentrbl. f. Gyn.*, xxx, 3.

Concerning Hæbotomy. By A. Döderlein.

Of 16 cases of subcutaneous hæbotomy, all the mothers and 15 babes lived. It has proven to be a trustworthy operation, free from danger. In the last case, after enlargement of the pelvis had been effected, spontaneous delivery was awaited with such good results that he recommends this method. He now agrees with Zweifel in undertaking operative delivery only when particularly indicated.—"*Zur Hebotomiefrage*," *Zentrbl. f. Gyn.*, xxx, 3.

Symphysiotomy and Pubiotomy. By W. Stoeckel.

Döderlein's operation, for the most part subcutaneous, has been simplified by Walcher, who performed it entirely subcutaneously, thus removing the danger of infection. Two such cases in Bumm's service ran light and uneventful courses for the mothers, but in the first (a flat rachitic pelvis; conjugate vera 8 cm.) the forceps delivery was very severe on the child, and the second babe sustained fatal injuries during the extraction (a generally contracted rachitic pelvis, conjugate vera 7 cm.). In pubiotomy the increased roominess from spontaneous spreading is substantially less than in symphysiotomy. Finally, the preservation of the infant's life is not to be overlooked;

both operations have a place, the pubiotomy for the lighter degrees of pelvic contraction, the symphysiotomy for the more severe (conjugate vera 8 to 8.5 cm. and 7 to 7.5 cm., respectively).—"*Symphysiotomie oder Pubiotomie*," *Zentrbl. f. Gyn.*, xxx, 3.

OPERATIVE ENLARGEMENT OF THE PELVIS. By Hugo Sellheim.

Sellheim regards as important the arterial vessels on the posterior surface of the os pubis, and the marked venous plexus before and beneath the symphysis, which are full of significance in subcutaneous hæbotomy, and apt to produce hæmatomata. He compares the increased pelvic space of the symphysiotomy, and of the hæbotomy by means of plaster casts of the pelvic cavity after such operations. If the separation at the points of incision is equal, he finds that the degree of pelvic enlargement is the same after both operations. The Walcher position is not only superfluous after these operations, but is positively dangerous to the integrity of the capsular ligaments. From his experience one should, as a rule, await spontaneous delivery, as has been recommended, particularly by Zweifel, in symphysiotomy.—"*Anatomische, experimentelle und klinische Untersuchungen zur operative Erweiterung des Beckens*," *Beitr. z. Geburtshülf.*, x, 3.

ANATOMY AND TECHNIQUE OF PUBIOTOMY. By J. Tandler.

This paper is a polemic against the uncertain knowledge of anatomy as displayed by various authors. The anatomy and technique of the operation are discussed, and nineteen of the most recently published cases are analyzed.—"*Zur Anatomie und Technik der Pubiotomie*," *Zentrbl. f. Gyn.*, xxx, 3; also, "*Zur Anatomie des Lateralschnittes*," Id., xxix, 28.

GIGLI'S PUBIC SECTION. By O. von Franqué.

Two additional cases are reported where von Franqué performed extramedian symphysiotomy, and the question is discussed as to whether, after making section through the bone, operative delivery should be undertaken or spontaneous expulsion awaited.—"*Schambeinschnitt nach Gigli*," *Prag. med. Wochensch.*, No. 14, 1906.

PELVIC ENLARGEMENT BY PUBIOTOMY. By Waldstein.

The writer disputes particularly that declaration of Tandler's, based on the results of experimental research, that pubio omy does not enlarge the pelvis, so far as the conjugate is concerned, except in an insignificant degree. In Waldstein's opinion, conditions brought about artificially are not to be compared with actual clinical circumstances. From the point of view of enlargement of the pelvic girdle, the results secured by inserting a wedge of greater or less size between the two faces of the pelvic section and those obtained from advancement of the fœtus cannot show much difference. As a matter of fact, and in the ordinary circumstances of parturition, pubiotomy does enlarge the true conjugate. In the normal pelvis the conjugate vera can be increased eight per cent of its own length; in the rachitic, over twenty-five per cent. Pelves contracted transversely undergo also an enlargement in the transverse direction, comparable to that rendered possible by symphysiotomy.—"*Ueber Beckenerweiterung durch Pubiotomie*," *Zentrbl. f. Gyn.*, xxx, 7.

HÆBOTOMY. By L. Seeligmann.

Stoeckel's lowest boundary for hæbotomy (conjugate vera of 8 to 8.5 cm.) is too large, according to Seeligmann. He has performed the operation with a conjugate vera of 7.5 m., or even 6 cm., and delivered a living child. He explains his method of making two short incisions for the passage of the saw, the soft parts being guarded by a grooved director, with drainage of the entire wound. Two additional cases, which ran fortunate courses for both mothers and babes, are to be reported in the future. Where the condition of the soft parts does not contraindicate, as in multiparæ, delivery should follow the hæbotomy. Under otherwise favorable circumstances, this operation may be preceded by a trial of the high forceps.—"*Hebotomie*," *Zentrbl. f. Gyn.*, xxx, 8.

ENLARGEMENT OF THE PELVIS IN HÆBOTOMY. By Krömer.

A woman, 26 years old, para iv, with a generally contracted flat pelvis (conjugate vera 8 cm.), had previously been delivered by means of the high forceps and Walcher position of living children, the heads, however, being markedly molded. On this occasion a subcutaneous hæbotomy on the side corresponding to the occiput was performed. As a result there occurred a complicated vulvovaginal laceration and a small vesical fistula. She was discharged on the twenty-third day with living child. Following the forceps extraction there was a distinct separation of four fingerbreadths between the fragments of the ramus. At the time of discharge, radiography showed still a two-centimeter separation, and confirmed Rosenfeld's experiments on the cadaver, which showed that

the pelvis is obliquely enlarged on the side of the section. In order to avoid secondary injuries due to malrelation between head and pelvis, artificial induction of premature labor and hæbotomy may be combined. Spontaneous delivery affords the best chances for distending the pelvic ring and soft parts with the least possible damage.—"*Beckenerweiterung bei der Hebotomie*," *Zentrbl. f. Gyn.*, xxx, 8.

AN UNSUCCESSFUL PUBIOTOMY; SYMPHYSIOTOMY. By F. Jessen.

This case was operated on as was Seeligmann's. The pelvis was a flat rachitic one. When the bone was three fourths sawed through, the saw broke. The resultant hemorrhage was so severe that sutures were at once introduced and symphysiotomy was resorted to. The pelvis was enlarged 6 cm., and the head, already deep, was easily extracted with forceps. Both cervix and vagina were lacerated at a point corresponding to the pubiotomy wound. The symphysiotomy wound healed quickly, but the sawed portion of the bone did not unite, no callus being produced, and tenderness persisting for a long time.—"*Missglückte Pubiotomie; Symphysiotomie*," *Zentrbl. für Gyn.*, xxx, 8.

PELVIC ENLARGEMENT BY HÆBOTOMY. By L. Aubert.

The conclusions of this interesting and general study are:

1. In hæbotomy, the bony surfaces of the section not being in the median line, the vesical and urethral supports are not injured; in this way, then, the structures behind the symphysis are sure to be avoided, as well as the clitoris. In symphysiotomy, these structures are very apt to be lacerated by the bilateral traction.

2. Laceration of the vagina and of the wound itself is best prevented in the extramedian section.

3. Severe hemorrhage, the clitoris not being touched, is much less to be feared. It must be remembered that the end of the corpus cavernosum may be cut, but from experience the loss of blood is almost always small and easily controlled.

4. The tension of the muscles attached to the bones involved oppose too great a degree of separation, and this is further limited by using the subcutaneous route.

5. Recovery takes place much more fortuitously in an open or subcutaneous osseous section than in a gaping wound into a joint, and the danger of infection is infinitely less. One has the certainty of securing an even bony reunion which never shows subsequent defect, a restoration of the pelvis *ad integrum*, and a perfect functional result.

6. Hæbotomy, as statistics show, replaces Cæsarean section in its relative indications (conjugate vera up to 7 cm.), embryulcia in many cases, and the induction of premature labor.

7. The operation may be performed in the case of a septic patient.

8. There is very little danger attached to it for the mother, and the child is granted the best chance to be born alive.

The disadvantages consist only in the occurrence of two accidents, which to-day no longer give rise to grave complications when cared for according to modern surgical requirements. These are those few lacerations of the vagina and such hæmatomata as have been unavoidable.

Aubert finally expresses the hope that Gigli's saw and Döderlein's needle will eventually take the place of the various mutilating instruments in every accoucheur's equipment.—"*De l'agrandissement momentané du bassin par l'hébotomie*," *Rev. méd. de la Suisse romande*, No. 1, 1906.

CAREY CULBERTSON.

THE MALIGNANCY OF VESICULAR MOLE.

Schickele says we have no histological test for the benignancy or malignancy of vesicular mole. In recent years we have learned that the formation of vesicles is less important than the proliferation of the chorionic epithelium. This characteristic it has in common with chorioepithelioma; the two differing in the intensity of the proliferation.

The presence of syncytium in the stroma of the villi cannot be taken as evidence of the malignancy of a vesicular mole, for such conditions are found in benign moles, and are wanting in moles followed by chorioepithelioma; and even in the normal placenta syncytium has occasionally been seen in the stroma of the villi. The migration of villi in vesicular mole does not justify calling it malignant, nor is it an evidence of malignancy in the mole to have some of these migrated villi undergo malignant degeneration outside the uterus.

When the epithelium of the vesicular mole proliferates and penetrates the decidua or the wall of a vein, and burrows into the muscularis, destroying it, the process is malignant. A chorioepithelioma may develop long after the removal of the mole, and is only related to it, in that the latter furnished the fœtal elements for proliferation.

It is hard, he says, to draw the line between the so-called destructive mole and a chorioepithelioma.

A fatal result is not proof of the malignancy of a vesicular mole.

Concerning the treatment of these cases, the author says every vesicular mole should be regarded as dangerous, and after its removal the uterus should be curetted and the material examined. If an extrauterine chorioepithelioma is found coincident with vesicular mole in the uterus (he mentions four such cases), both should be removed and the uterus curetted. If the findings are negative, exploration and examination should be repeated in four weeks, or earlier, if a malignant process is suspected. If the primary or a subsequent curettage shows proliferating epithelial elements with destruction of the musculature, removal of the uterus is justified.

The presence of a chorioepithelioma outside the uterus is not alone a sufficient indication for removal of the uterus, and only becomes so when examination of the uterine scrapings points to the malignant character of the uterine growth.

In the light of our present knowledge, vesicular mole must be regarded as quite rare, and its prognosis not in such a degree bad as to make an absolute indication for immediate extirpation of the uterus. — *Archiv f. Gyn.*, bd. lxxvii, h. 1.

WILLIAM B. FEHRING.

Northwestern University Medical School Number

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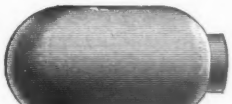

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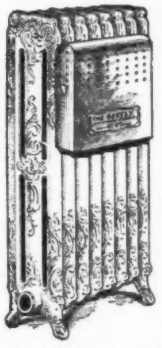

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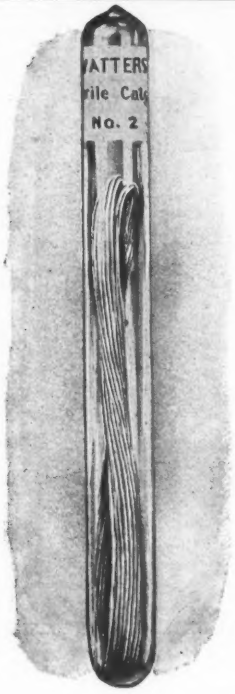

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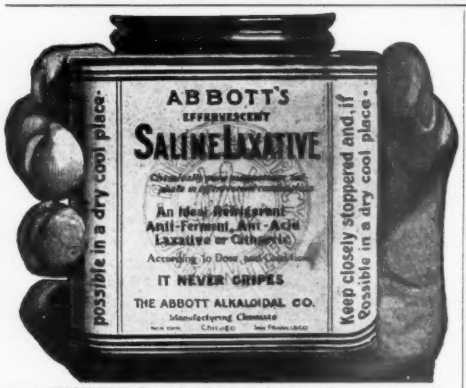

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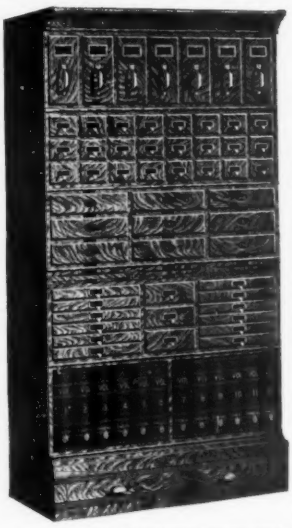

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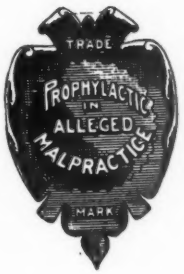

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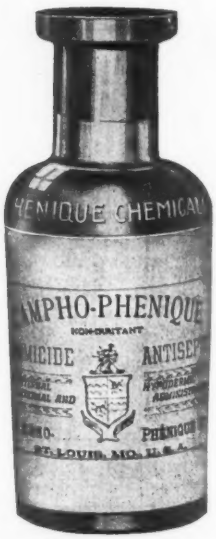

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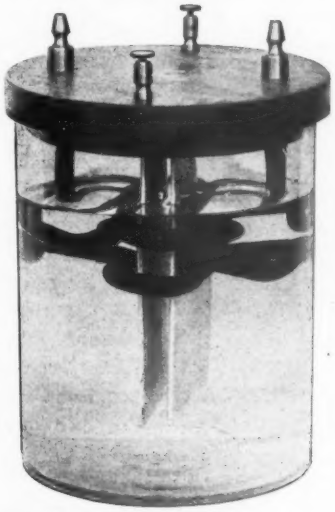

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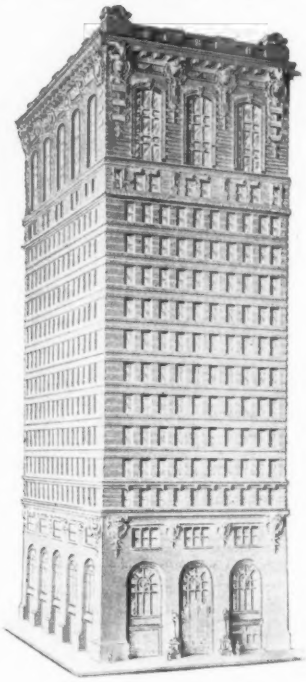

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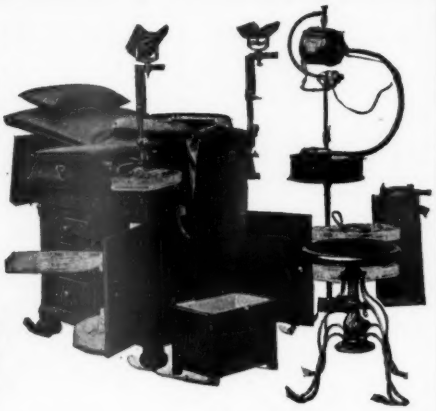

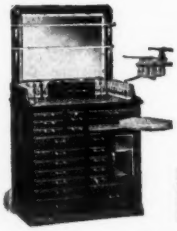

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T. Melville Hardie, M. D., B. A

Nervous Diseases
Sydney Kuh, M. D.
Richard Dewey, M. D.
Daniel R. Brower, M. D.

Skin and Venereal Diseases
L. Blake Baldwin, M. D.

Hydrox Vichy

AFTER GRANDE GRILLE SPRING

A Gaseous Sodio-bicarbonated Mineral Water

Alkalinity: 4 to parts per 100,000

True to the formula of the mineral spring water. Its freedom from the multitude of microscopic infusoria usually found in spring waters is due to the use of Hydrox the double distilled water as its base.

ANALYSIS	
Potassium Sulphate	20.404
Sodium Sulphate	11.771
Sodium Phosphate	0.422
Sodium Chloride	54.878
Sodium Bromide	0.013
Sodium Iodide	0.003
Sodium Carbonate	380.130

PARTS PER 100,000	
Ammonium Carbonate	0.469
Calcium Carbonate	25.003
Strontium Carbonate	0.232
Magnesium Carbonate	3.529
Iron and Manganese	Traces
Alumina	0.078
Silica	6.406

Hydrox Vichy possesses an incontestable efficacy in the treatment of diseases where it is desired to overcome the acidity of the stomach or intestines, cause increased fluidity of the bile or render the urine alkaline.

THE CONSUMERS COMPANY

Phone Yards 1220

35th and Butler Streets, Chicago

DESICCATED THYROIDS

U. S. P.

Each grain represents approximately five grains of raw gland.

THYROID TABLETS

Each tablet contains two grains of powdered Thyroids U. S. P.

Suprarenalin Solution

A stable preparation of the active principle of the suprarenal glands.

Suprarenalin Ointment

Permanent, and especially adapted to eye, ear, nose and throat work.

Armour & Company

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